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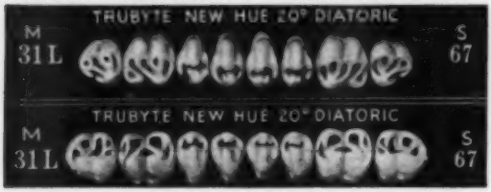

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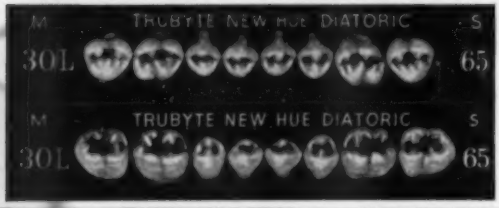

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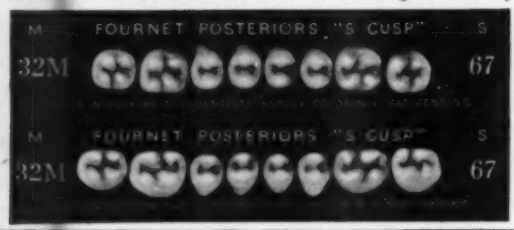

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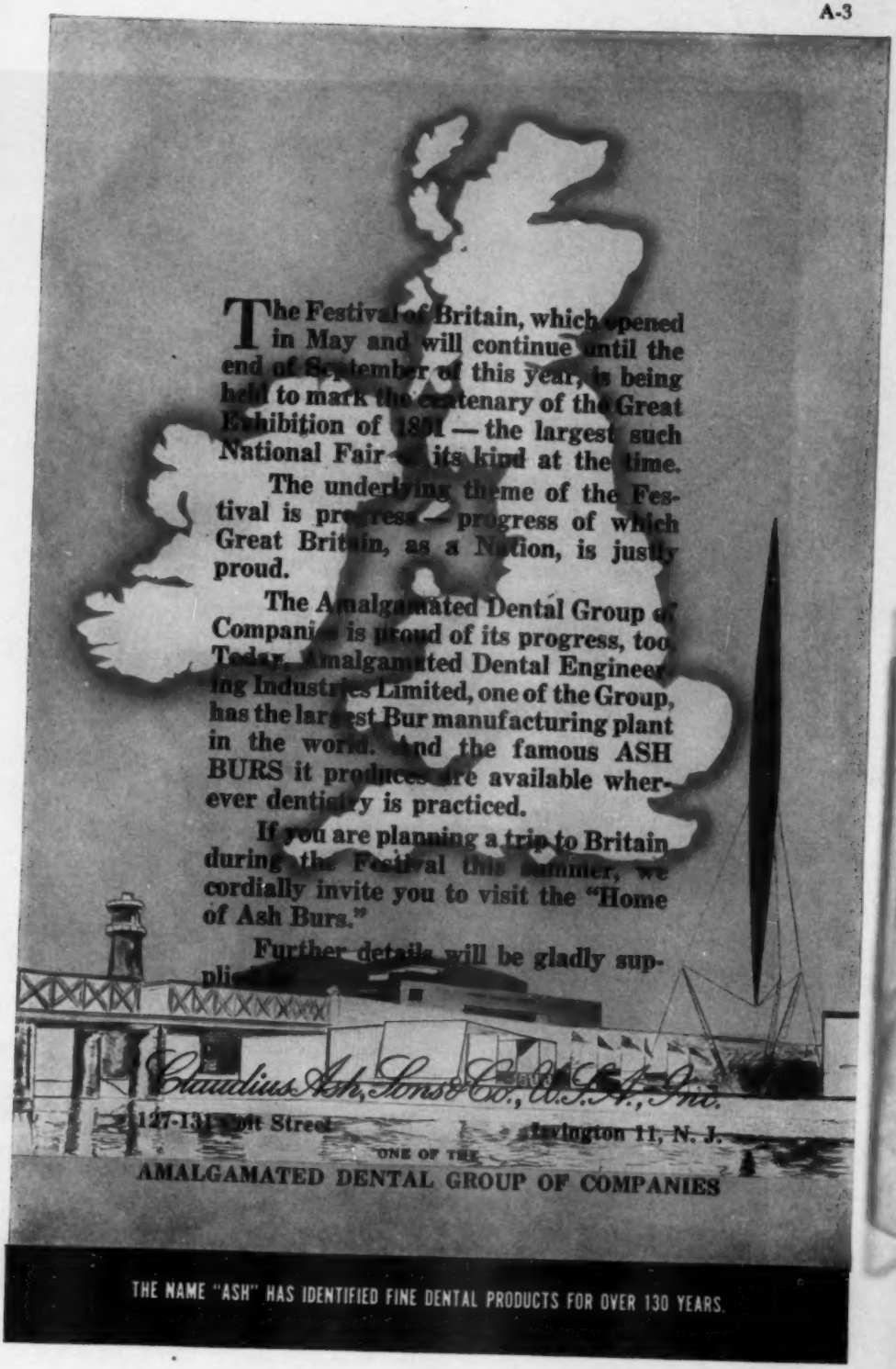
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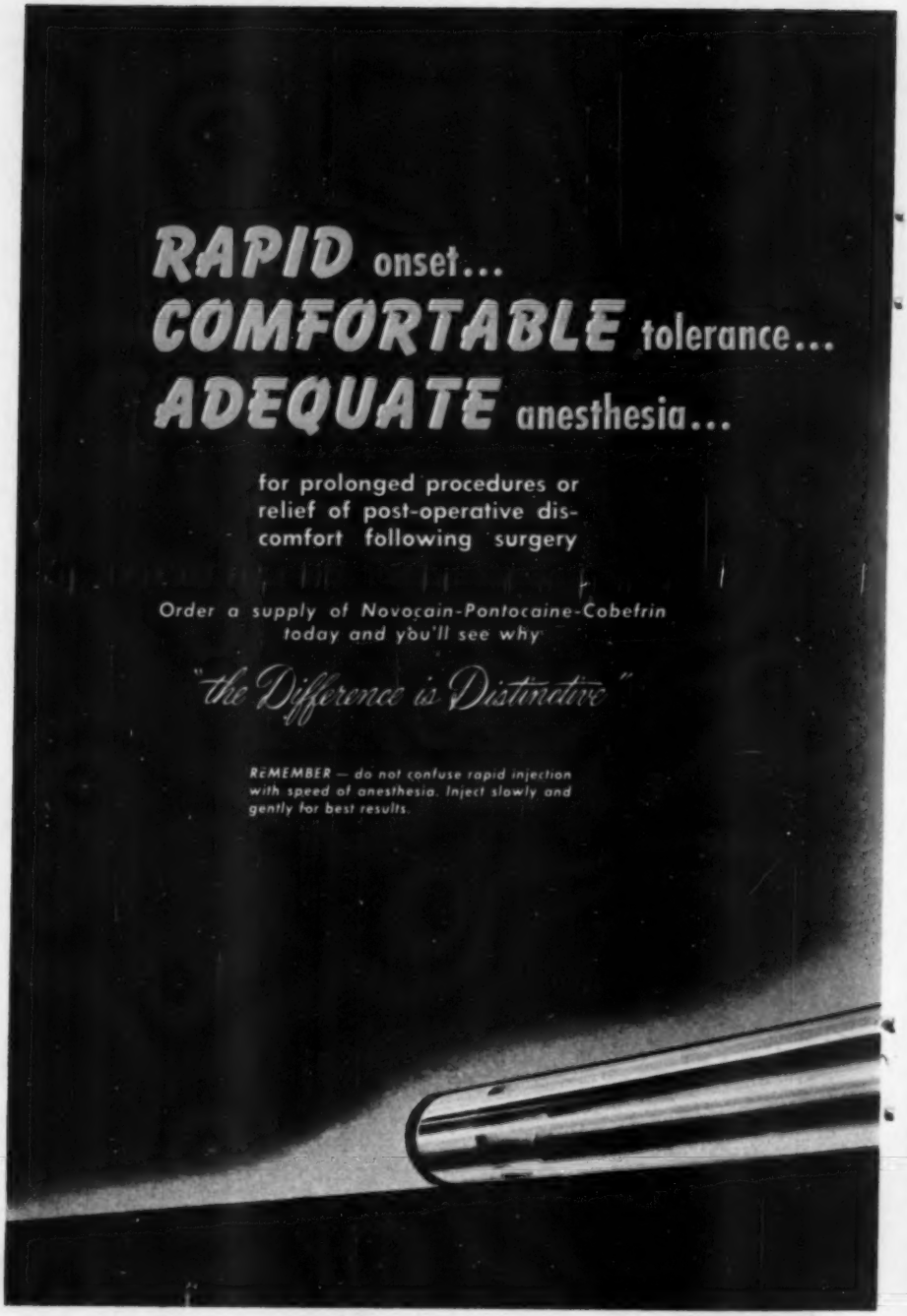

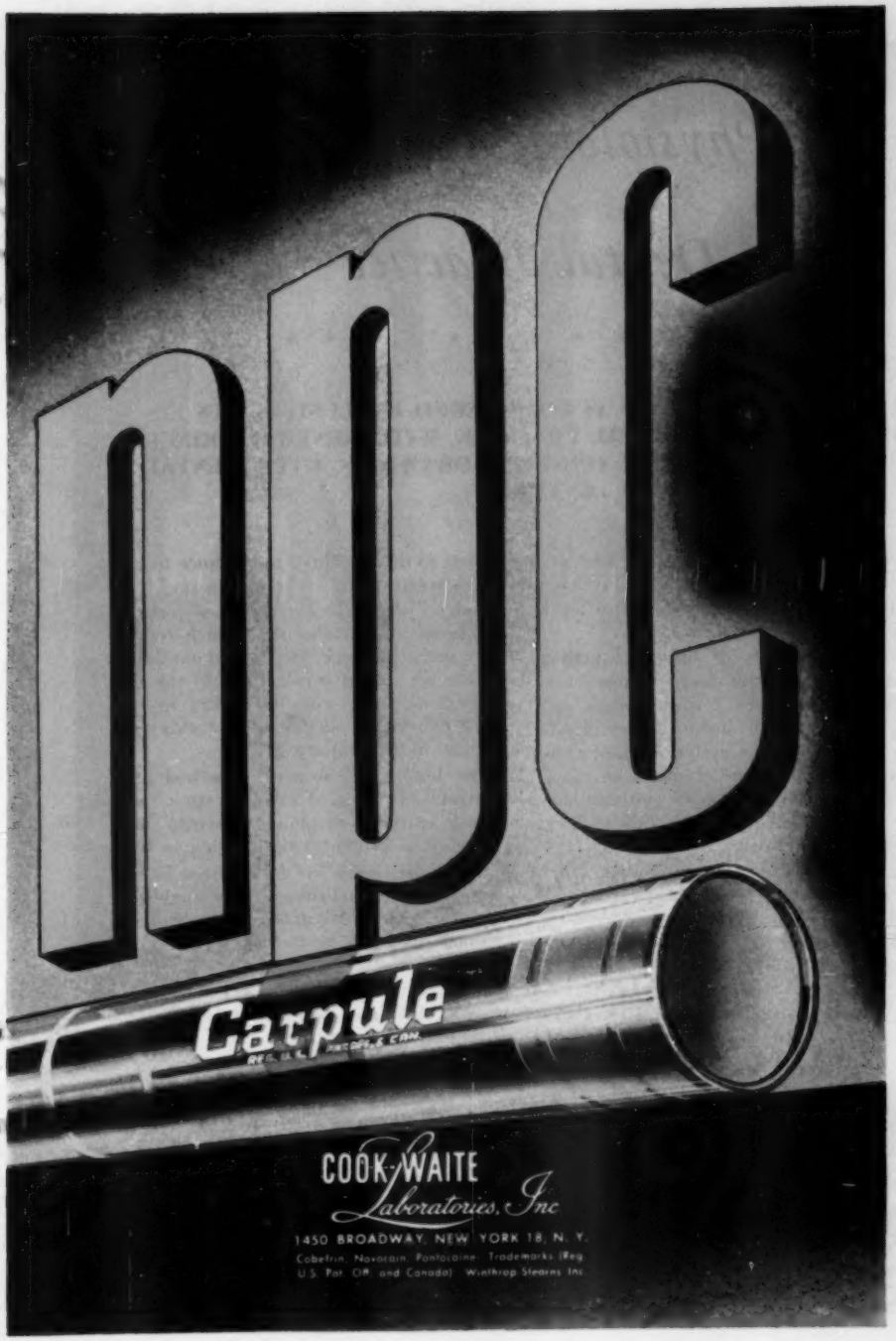
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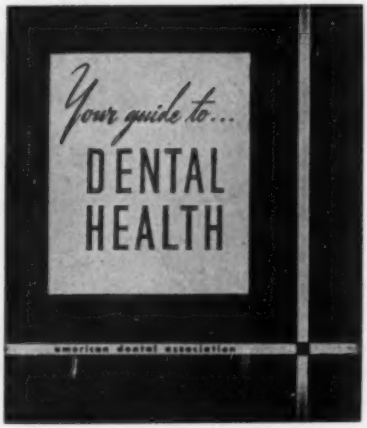

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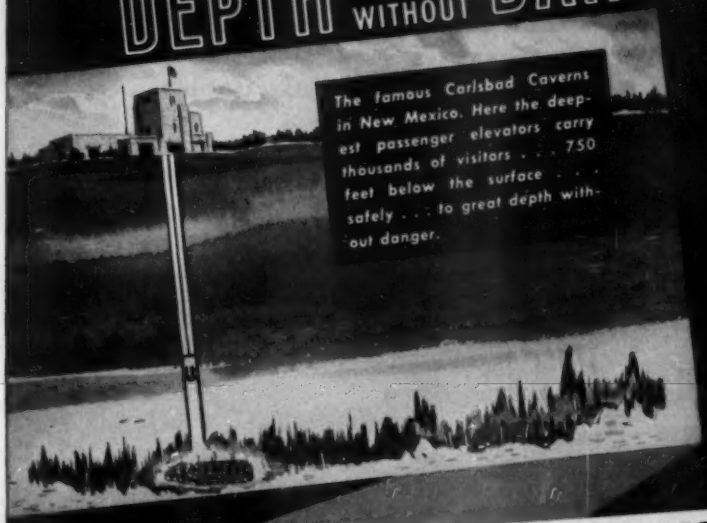

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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Restorations of silver amalgam

Miles R. Markley, D.D.S., Denver

Preservation of a healthy set of natural teeth for each patient should be the objective of every dentist. All work in the health field is aimed basically at conservation of the human body and its functions. The opthalmologist does not revel in the number of sockets he can prepare for plastic and glass substitutes for eyes. The surgeon is so conservative that loss of even a small part of a finger or toe, notwithstanding the fact that the patient will still have nine more, is considered a tragedy. Likewise, loss of even a part of a human tooth should be regarded as a serious injury, never to be considered lightly, and the tooth is certainly worthy of the most careful restoration. Therefore, in the tradition of all health care, dentistry offers its highest service in the combination of routine preventive and restorative care. Until complete control of caries by preventive measures is accomplished, restorative dentistry must continue as a most important part of dental practice.

Silver amalgam has saved and continues to save more teeth than all other materials combined. Carefully handled, silver amalgam restorations will give more service for the time and effort expended than any other. No apology need be made to any patient for their use. There are not enough dentists to serve the public with any durable material, amalgam not excepted. However, more amalgam restorations can be made in a given length of time. Practical suggestions for making good silver amalgam restorations follow.

CAVITY PREPARATION, CLASS I AND II

Although well condensed silver amalgam resists crushing forces up to 50,000 pounds per square inch, it is brittle, it

Presented before the Section on Operative Dentistry, ninety-first annual session of the American Dental Association, Atlantic City, November 1, 1950.

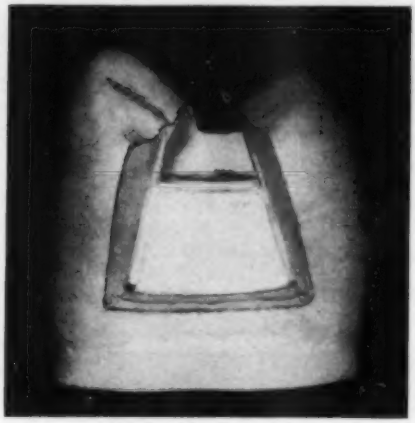

Fig. 1 • Modified Bronner type of Class II cavity for silver amalgam

lacks edge strength and it depends upon bulk for strength. Therefore, it serves best in a cavity designed to favor these properties. Bronner[1] suggested adapting the principles of G. V. Black's Class IV cavity to Class II, resulting in a two surface preparation highly favorable to amalgam. It is retentive, it is conservative, and it subjects the restoration to a minimum amount of occlusal stress. (See cavity outline, Fig. 1.)

Since the enamel rods of a tooth run in a direction perpendicular to the surface, preparation of cavity walls so as to parallel or follow the enamel rods will yield strong filling margins with right angle joints. The operator should be ever mindful of the direction of the enamel rods on all margins of the cavity. To bevel the enamel in a stress-bearing area results in a frail margin of amalgam which will be subject to fracture. At the other extreme, leaving unsupported enamel rods invites failure with any filling material. Figure 2 illustrates typical amalgam failure of occlusal margins where traditionally parallel walls are prepared. The thin margin has chipped leaving a crevice. Corrosion set in, opening a path for caries to start again. Figure 3 shows that by more nearly following the enamel rods in occlusal preparation, much stronger filling margins result. More occlusal stress is taken by the tooth structure and less by the restoration itself. Figure 4 shows that the buccal and lingual walls, at the proximal portion of a two surface filling, must closely follow the cleavage of enamel. Violation of this rule results in failures illustrated in A and B of Figure 4.

A gingival bevel is necessary for an amalgam restoration as shown in Figure 5. The gingival seat of a two surface cavity is properly cut at a right angle to the occlusal stress. This seat, extended through the enamel, will invariably leave unsupported rods at the gingival margin. Therefore, a slight bevel of about 20 degrees is routinely necessary here, unless the gingival margin falls on cementum. Then no bevel is needed. The axiopulpal angle is rounded at the same time, adding strength at the juncture of the occlusal and proximal portions of the filling, and reducing internal stress created by any sharp internal angle.

If a triangular hardwood wedge is forced into each proximal space to be prepared, it will hold the septal tissue and the dam safely away from the bur and provide easy access for cutting the gingival seat and bevel. The bur will cut into the wedge to the desired depth of the seat. Usually this same wedge can be used later to support the matrix. Such a wedge is also useful during the roughing-out process before the dam is placed. Septal tissue compressed in this way does not present the healing problem of lacerated tissue, and the nuisance of hemorrhage is practically eliminated.

The resultant cavity has a narrow occlusal surface, and is narrow across the

1. Bronner, Finn J. Mechanical, physiological and pathological aspects of operative procedures. D. Cosmos 73:577 (June) 1931.

marginal ridge, which leaves maximum strength in tooth structure. Such a narrow occlusal step will obviously not support the proximal portion of a filling. However, neither will a broad occlusal extension alone adequately support the proximal portion of a two surface amalgam filling in a permanent tooth. Functional stress through the years will cause such a filling to flow out of the cavity and fail. Therefore, the proximal portion must be so shaped as to largely retain itself. This is accomplished by locks, opposing grooves, cut in the dentin with no. 699 or no. 700 tapered fissure burs, extending from the gingival seat just to the occlusal surface, but without appreciably showing in the occlusal enamel (Fig. 6). These grooves must not undermine the proximal enamel, so in a shallow cavity the grooves are cut partly at the expense of the axial wall. When amalgam is well condensed into these grooves, a filling is sufficiently locked so that little stress is taken by the occlusal dovetail.

No occlusal step is made on lower bicuspids and only a small one is made on the distal portion of upper molars (Fig. 7). Mesiodistoocclusal restorations should be avoided in upper molars. The strong oblique ridge should be conserved wherever possible to strengthen this tooth against splitting. Even sound teeth are sometimes split in function by the hydraulic pressure created by chewing (Fig. 8, right). Deep and broad cavities create the effect of elongated cusps which are more susceptible to fracture.[2] The greatest strength is achieved by a conservative extension of the occlusal portion of an

2. Ingraham, Rex. The application of sound biochemical principles in the design of inlay, amalgam and gold foil restorations. J.A.D.A. 40:402 (April) 1950.

Fig. 2 • Showing weakness of amalgam occlusal margins where cavity is prepared with parallel walls. The thin, frail margins have chipped, allowing corrosion and caries as illustrated on the left

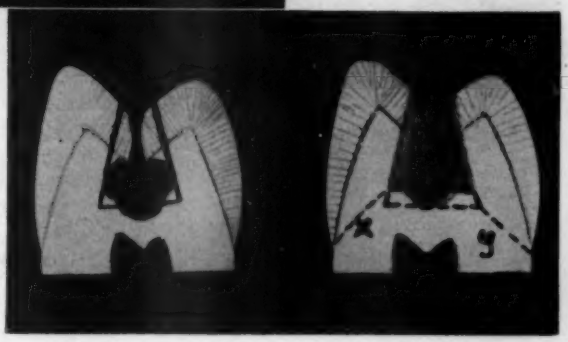

Fig. 3 • Safest occlusal preparation for amalgam. Converging walls more nearly follow enamel rods. Restoration is carved without sharp grooves. Note that a minimum amount of stress will be taken by the filling material. All filled teeth are subject to fracture but a cavity prepared to X is stronger than one prepared to Y. Preparation at X has ample seat on sound dentin

amalgam cavity just to the dentin, as narrow as possible (Fig. 8, left).

CAVITY OUTLINE, PROXIMAL SHAPE FOR CLASS II

A flat pointed pencil held perpendicular to the tooth to be prepared, with the flat side resting against the contacting tooth can be made to describe the proximal cavity outline (Fig. 9, left). This line is modified to favor the kind of restorative material to be used (Fig. 9, right). The outline for amalgam and gold restorations will have a common gingival seat of varying width, broad for amalgam, giving splendid extension for prevention and it will be narrow across the marginal ridge. For the inlay the gingival seat must be narrower and the marginal ridge area wider to provide draft. It will be seen that with amalgam an ideal extension for prevention at the buccogingival and linguogingival angles can be made with a minimum of width at the marginal ridge. The esthetic result is also good. Figure 10 compares amalgam cavity and inlay cavity preparations in an upper molar.

Although conservation is the rule with this material, cusps should be capped with amalgam where they are weak (Fig. 11). In fact, more cusps should be capped with amalgam than are necessary with gold inlays, because tough gold alloys can resist the splitting tendency of function. In cavity preparation for amalgam restorations, tooth structure too weak to withstand the load unassisted should be removed and the cusp capped (Fig. 12). Remembering that strength results from bulk, such cusps should be capped with two or three times as much material as would be used with cast gold; that is, 2 or 3 mm.

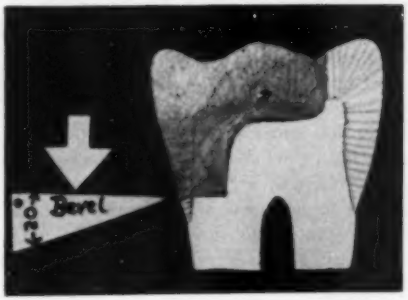

Fig. 5 • Cross section of Class II filling. A slight gingival bevel is necessary for amalgam where the cavity margin is on enamel. The axiopulpal angle is also rounded as shown

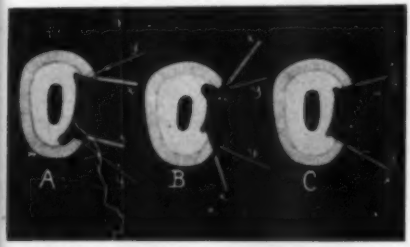

Fig. 4 • Cavity for amalgam showing failure and success in proximal shapes. A: If parallel cavity walls are prepared as in A, at X – X to favor retention, undermined enamel at Y–Y will fail. B: If diverging walls are prepared for amalgam, as at X – X, the frail filling margin will fracture, opening a fissure for corrosion and caries. Y – Y shows direction of enamel rods. C: Correct cavity outline following the enamel rods in proximal region at X – X, Y – Y, which will give the strongest result

Badly broken down teeth can be satisfactorily restored with amalgam if adequate retention is provided for every stress. It must be remembered that fillings do not stick to teeth, but cavities must be engineered with a retentive design. When retention by locks cut into dentin is insufficient, 0.025 inch diameter threaded iridioplatinum pins cemented into holes drilled by a no. ½ round bur will provide excellent anchorage about which amalgam can be condensed (Fig. 13).

CAVITY PREPARATION FOR CLASS V

The gingival third or Class V cavity presents special problems of its own. On the

convex buccal surfaces of posterior teeth, following the enamel rods leaves diverging walls which make these fillings difficult to retain, as shown in B and C of Figure 14. If parallel walls are cut to favor retention, frail unsupported enamel is left to fracture and fail (Fig. 14, A). Retention must be accomplished by undercuts in the dentin of the occlusal and gingival walls. Very large gingival fillings are best retained by threaded iridioplatinum pins, cemented into holes drilled in the dentin mesially and distally to the pulp. Class V fillings should faithfully restore the convex shape which sluices food safely across rather than into the gingival crevice.

AMALGAM FOR CHILDREN

Silver amalgam is the best restorative material for practically all deciduous teeth including incisors, and for permanent posterior teeth to the ages of 15 or 16. Only after this age are teeth sufficiently erupted past the contact areas to permit gingival extensions warranting gold restorations. The conservatism possible with amalgam also recommends this material for young patients.

CEMENT BASES

Only those cavities close to the dental pulp need cement bases under amalgam restorations. Clinical experience indicates less thermal shock to teeth bearing amalgam restorations than to those with comparable gold foil restorations. The conservative cavities best suited for amalgam expose a minimum area of metal surface to conduct heat. Routine application of intermediary varnish to cut dentin will provide ample protection for 90 per cent of cavities. Discoloration of tooth structure under amalgam fillings can be lessened by varnishing the dentin walls of a cavity.

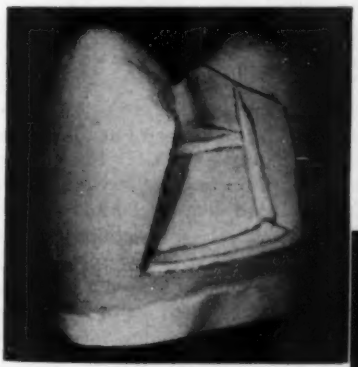

Fig. 6 • Modified Bronner type of cavity showing lock cut into dentin of opposing proximal walls with a no. 700 or 699 tapered fissure bur. Care must be taken to leave sufficient dentin supporting the enamel. In shallow cavities the cut is made somewhat at the expense of the axial wall

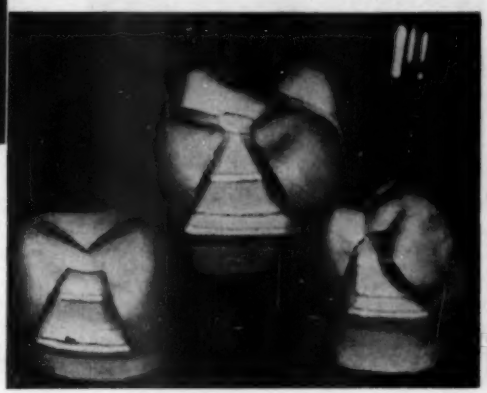

Fig. 7 • Lower bicuspids and upper molars are stronger if separate mesioocclusal and distoocclusal restorations are placed leaving tooth support between the occlusal portions. Upper bicuspids and lower molars usually have sharp grooves requiring a step extending completely across the occlusal surface to a safe area for finishing

Where cement bases are used, their bulk should be kept small in the interest of keeping amalgam bulk and strength at a maximum. Dental cements lack crushing strength sufficient to support a restoration. They have only about one fourth the strength of well condensed amalgam. Therefore all fillings subject to stress must have ample seating upon sound dentin.[3] Silver amalgam frequently can be used to advantage as a base for gold crowns and inlays. It is not only four times stronger than cement, but it is second only to gold foil in resistance to dissolution and recurrence of decay. It can be placed where access is difficult better than gold. It is invaluable as a foundation for fixed bridge abutments.

Sensitive teeth with amalgam fillings usually can be traced to overheating the tooth during cavity preparation. Any temperature exceeding 136°F. is considered injurious to the protoplasm of pulp tissue. The cavity is roughed out under a stream of water, then completed with a rubber dam in place. Dental burs and stones should at all times be run either very wet or very dry. Teeth restored with amalgam should be comfortable because the cavity is prepared and the filling placed in one continuous operation in a cavity which never need be contaminated.

With amalgam and gold foil alike, G. V. Black stressed the importance of recutting cavity margins after contamination with any moisture or drug. Marginal discoloration and recurrent caries may result from the washing out of the soluble residue left on contaminated cavity margins.[4]

All carious dentin must be removed, for the infection will continue under the restoration unless entirely removed. Experience has shown that caries can be detected by appearance and by the density or feel of dentin to a sharp instrument. Loupe binoculars will aid in careful inspection. Only in extreme cases is any medicament needed. Precipitated silver nitrate for posterior teeth or beechwood creosote[5] for anterior teeth will sanitize[6] questionable dentin in those occasional cases where complete caries removal might result in pulp exposure. Enamel walls must be recut after the use of these or any drugs.[4]

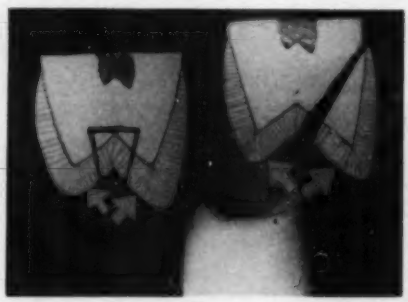

Fig. 8 • Sound teeth are sometimes fractured in function, as shown at the right, by the hydraulic wedging action of the opposing tooth against a mass of food. The occlusal outline shown at the left favors the properties of silver amalgam by imposing most of the occlusal stress load on the remaining tooth structure

MATRIX

If silver amalgam is to be strong and durable, it must be condensed forcefully into a space with rigid walls. If one of the walls yields in the process, crystallization is disturbed and weakness results. Condensing into a weak or yielding matrix cannot reduce mercury content down to a percentage which will provide strength and hold a polish resistant to corrosion. Proper adaptation to cavity walls cannot

3. Black, G. V. Operative dentistry, vol. II, ed. 4. Chicago, Medico-Dental Publishing Co., 1920, p. 132, 133.

4. Black, G. V. Operative dentistry, vol. II, ed. 4. Chicago, Medico-Dental Publishing Co., 1920, p. 128, 129.

5. Dorfman, Albert; Muntz, J. A., and Stephan, R. M. I. In vitro studies on sterilization of carious dentin. II. Extent of infection in carious lesions. J.A.D.A. 30:1901 (Dec.) 1943.

6. Council on Dental Therapeutics. Accepted dental remedies, ed. 14. Chicago, American Dental Association, 1949, p. 172.

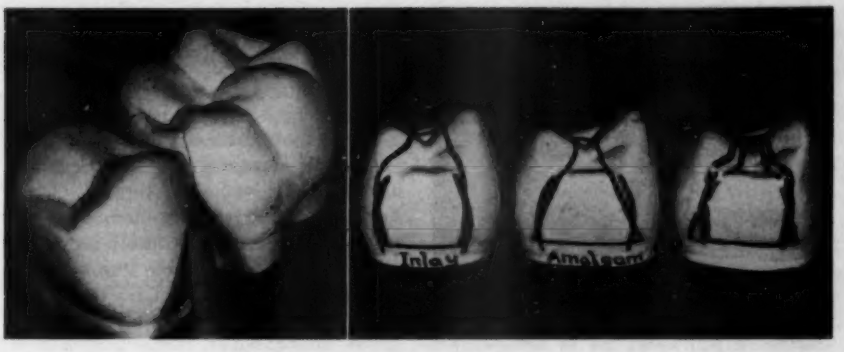

Fig. 9 • Left: Proximal shape should be routinely outlined in the mouth with a pencil cut to a thin flat point. Position and size of the proximating tooth determines the outline. Lines are drawn from the marginal ridge to the gingival tissue on both the buccal and lingual sides. These lines are then modified to describe the ideal outline for the particular restorative material to be used, as shown at right. Right: The curved proximal lines were inscribed by the pencil shown at the left. Cavity outline for amalgam and gold inlay restorations will have a common gingival outline only. Amalgam permits a gingival extension laterally across the scribed lines into zones safe from recurrent caries. The filling is narrow across the marginal ridge and occlusal step. A broad occlusal outline and more constricted gingival are necessary for an inlay. Model at extreme right shows both amalgam and inlay cavity outlines superimposed

Fig. 10 • Comparative cavity preparations on upper molar for amalgam at the left and for gold inlay at the right. For amalgam the strong oblique ridge is preserved even if both proximal surfaces require filling. If the inlay is made to cross the oblique ridge, arms are extended through the buccal and lingual grooves to tie the tooth crown together to prevent possible splitting

be achieved in a yielding space. When a cavity involves one or more sides of a tooth, a form or matrix must be built which will both rigidly support the restoration while building, and define the contour on those surfaces which cannot be readily built to excess. Dozens of commercial matrixes have been marketed, all with defects and limitations.

Two types of matrix, each easily made in the office, will serve for almost any situation. One is made of a stainless steel strip 0.0015 of an inch thick. This material is thin enough to permit burnishing and contouring of the proximal portion from the gingival margin up to and including the contact area. Using the small hole of the rubber dam punch, with a shearing action holes are made near the gingival corners of the matrix. The strip is next laid on a paper pad and with a circular motion of a large egg shaped burnisher the center is made somewhat concave to start tooth form shape (Fig. 15). Proper width is next established. The strip should be one or two millimeters

Fig. 11 • Left: Preserving a frail cusp invites splitting. Right: Cusps can be safely capped with amalgam if enough bulk of material (2 to 3 mm.) is used

higher than the finished restoration. The matrix strip is then secured around the neck of the tooth by Dentotape threaded through the holes, wrapped around the tooth twice and tied.

A triangular wedge of hardwood is inserted free of the gingival margin so as not to interfere with contour. It can be inserted either from the buccal or the lingual side, depending on which is most accessible, and from which side it is least apt to impinge upon the matrix strip above the gingival margin (Fig. 16). This wedge against the cushion of the Dentotape performs three important tasks:

1. It holds the matrix snugly against the tooth so that subsequent shaping with a warm instrument does not alter the gingival fit.

2. It separates the teeth slightly to compensate for the thickness of the matrix and to give snug contact in the finished restoration.

3. It holds the proximating teeth firm so that they offer rigid support for condensation, controlling a tendency of the teeth to move away from the matrix which is one common cause of overhanging margins.

Hot green stick modeling compound is now built over the steel strip, two separate pieces being used for each proximal space, one buccal and one lingual. Finger and thumb pressure from the buccal, lingual, and occlusal sides then forces the compound through the interproximal space. The hot modeling compound sticks securely to the dry tooth surfaces. It is important that matrix strips or bands be supported everywhere with compound. Actually, the rigid compound is the matrix. The thin metal simply provides a smooth, hard, burnishable lining against which the amalgam can be built. This done, a warmed burnishing instrument (SSW double-ended filling porcelain instrument no. 2A is excellent) can be manipulated within the cavity side of the matrix to develop the tooth form of the finished restoration from the gingival margin up to and including the contact area. The compound, warmed through the steel strip, will flow to allow this adjustment (Fig. 17). It is important that the buccal and lingual margins be kept fitted snugly by the matrix, for an open crevice here will trap mercury during condensation, resulting in a weak, mercury-rich margin. If the metal is inadvertently pushed away from a margin, a heated plastic instrument should be advanced through the compound to reposition the metal at the margin. A finger held forcefully on the softened compound at this spot will readapt the area. On cooling, burnishing the metal to establish tooth form is resumed.

The matrix from the contact area to the occlusal surface is shaped like a funnel "to invite the filling," to quote Charles Woodbury.[7] After the condensation is completed, and before the matrix is removed the amalgam is cut to anatomical form with a gold knife, from the height of the marginal ridge to the contact area.

For restorations where there is no contacting tooth and also for large, complicated restorations, a second kind of matrix is made from an annealed, seam-

7. Personal instruction of Charles Woodbury, Woodbury Gold Foil Study Club.

less copper band, contoured to approximate tooth form, and thinned with a coarse sandpaper disk at the contact areas. This is placed over the tooth, and a tuck is made with flat nose pliers up the side where a sound cusp remains if possible. This is done in such a way as to fasten it close to the neck of the tooth, but to leave it free for full contour elsewhere. It is wedged where possible. The copper band matrix is then blocked around the entire circumference with compound. Here again, the compound is really the matrix, while the metal provides a smooth lining against which the filling is built. The copper band is now contoured from the inside with a warm burnishing instrument as was the stainless steel matrix. This procedure is to the amalgam filling what shaping a wax pattern is to an inlay, except that an inlay can be corrected by soldering and polishing outside of the mouth. A completed amalgam restoration can be no better than the matrix and cavity preparation into which it is built.

PREPARING THE AMALGAM

Routine use of an alloy that meets the specifications of the Council on Dental

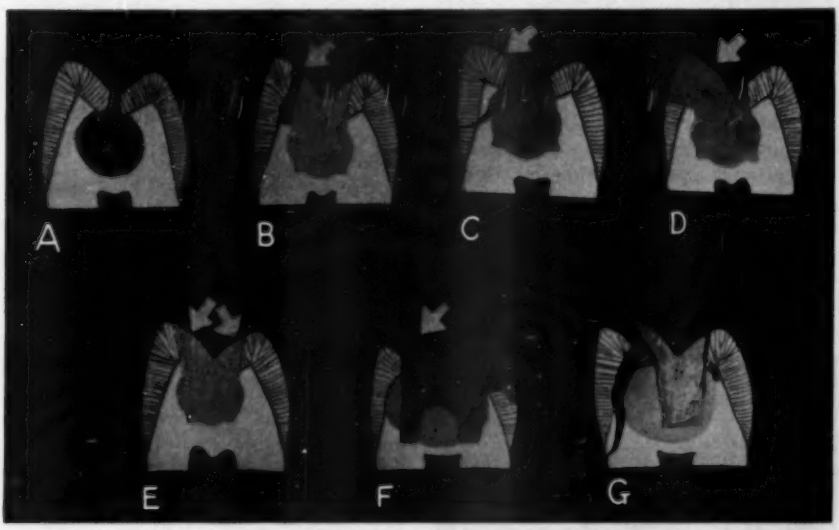

Fig. 12 • First row: The cross section of an upper bicuspid requiring an MOD restoration and having a caries-weakened portion is shown in A. Placing amalgam in an occlusal preparation having parallel walls in an effort to shield the weak buccal wall somewhat will result in an acute-angle margin which commonly chips, as shown in B, allowing corrosion to undermine the restoration. If the conservative converging-wall design is followed, the amalgam margins are safe enough with the bulk of the stress on tooth structure. However, the tooth structure may be so weak as to fracture, as shown in C. The cusp should be capped with amalgam, preferably to a depth of 3 mm. as shown in D.

Second row: When gold margins are kept strong, as in E, a weak tooth can be conservatively protected without capping the cusp. On a still weaker tooth, as in F, the buccal cusp can be esthetically capped, using from 1 to 1.5 mm. of gold alloy. Failures with gold, as shown in G, are common where insufficient bulk of gold is used or where restorations are seated on cement rather than sound dentin

Research of the American Dental Association is a simple safeguard. A good filling can never be made with an inferior alloy.[8] The alloy and mercury are carefully proportioned according to manufacturers' directions. Too much mercury will yield a mercury-rich filling. Once excess mercury has been incorporated, it never can be reduced sufficiently to produce a strong filling. Too little mercury will leave some surfaces of the alloy particles unamalgamated. This causes voids in the completed restoration which invite pitting and corrosion.[9] More mercury should never be added to an amalgamated mass. To do so will cause a weakened product.[10]

Amalgamation is best done in an approved type of mechanical amalgamator.[11] About eight seconds with the pestle, followed by two seconds with the pestle removed will yield a completely amalgamated and plasticized mass in a fraction of the time required by mortar and pestle or thumbstall.

The exact amount of time for a given alloy and amalgamator must be determined by experience. Successive trial mixes should be made, varying the time. Visual inspection of each trial mix, wiping it across the palm of the hand, will determine the least time necessary to create a completely smooth mix. Each individual amalgamator and brand of alloy will be found to vary.

A standard amount which can be condensed in three minutes is amalgamated at one time. Five hundred and eighty mg. of alloy proportioned with mercury can usually be condensed in three minutes. One mix is enough for average occlusal cavities. Two or three mixes will fill ideal two surface cavities. Some large restorations may require as many as 10 or 12 mixes, each mix being amalgamated three minutes for thorough condensation. A time clock is set for three minutes and any excess left after that time is discarded and successive mixes prepared. James Sweeney calls this "mixing on the installment plan."[12] After three minutes have

Fig. 14 • The problem of Class V or gingival third restorations. In A, B and C, Y – Y shows the direction of enamel rods in large and small cavities on the convex buccal surfaces of lower molars. If a cavity with parallel walls is prepared as in A, X – X undermined enamel rods will disintegrate resulting in failure of the filling at the margins. B and C show the correct outline for small and large cavities, illustrating also the difficulty of securing enough retention in the dentin to lock the filling in place

Fig. 13 • Badly broken down teeth can be effectively restored with amalgam as shown at the right. It is important that retention locks be built into the dentin at strategic points as shown. Left: Where extreme loss of tooth structure makes dentin locks inadequate, 0.025 threaded iridioplatinum wire pins, cemented into holes drilled by a no. ½ round bur provide excellent supplementary retention

8. Skinner, E. W. The science of dental materials, ed. 3. Philadelphia, W. B. Saunders Co., 1946, p. 296, 376.
9. Schoonover, I. C., and Souder, Wilmer. Corrosion of dental alloys. J.A.D.A. 28:1278 (Aug.) 1941.
10. Taylor, N. O. Amalgam technic: dependable and dangerous practices. J.A.D.A. 17:1880 (Oct.) 1930.
11. Phillips, R. W. Physical properties of amalgam as influenced by the mechanical amalgamator and pneumatic condenser. J.A.D.A. 31:1308 (Oct. 1) 1944.
12. Sweeney, J. T. An improved technic for packing and condensing uniform amalgam restorations by hand. J.A.D.A. 28:1463 (Sept.) 1941.

passed, crystallization has progressed to the extent that excess mercury cannot be removed sufficiently to yield a strong filling.

Dental amalgam is highly susceptible to contamination. With the best alloys today, the slightest amount of moisture or salt solution such as perspiration or saliva will cause gas to form within the mass. Gas pressure results in delayed expansion and blistering. Delayed expansion may result in toothache after several days, and it may cause fillings to bulge from the cavity. Moisture contamination will also cause pits, voids and layering. For these reasons amalgam must never be touched with the fingers and must be condensed into a clean, absolutely dry, cavity.[13,14]

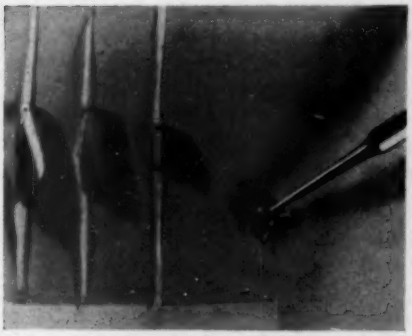

Fig. 15 • Matrix construction. Stainless steel of 0.0015 inch thickness is cut and punched with the small hole of the rubber dam punch using a shearing action. With a large ball burnisher used in a circular motion, the center area is stretched to start conformance to tooth form. Dentotape is next threaded through the holes, to be wrapped twice around the neck of the tooth and tied

CONDENSATION

The prepared mass of amalgam is placed on the bracket table and divided into three parts. The first portion is picked up in the squeeze cloth and the mercury content reduced by squeezing to a consistency which will pack well under heavy hand condensation pressure. The filling is built up in thin layers, bringing mercury to the top of each successive layer. The first portion should be squeezed much the same as succeeding portions, never starting with a soft mix which may leave mercury-rich margins. The time clock is kept in view of the assistant. When one minute has passed, she takes the second portion of amalgam, discarding any remainder of the first, squeezes and rubs it in the squeeze cloth and passes it bit by bit into the cavity for condensation. At the end of the second minute the third portion is likewise prepared, to be replaced quickly with a newly amalgamated mix at the end of the third minute. If the entire portion were squeezed immediately after amalgamation, crystallization would be hastened on the entire mass and the working time shortened.

Preproportioning of an estimated number of mixes into amalgamator capsules saves time between mixes. The operator should continue condensation meanwhile, or else the setting of the mass will cause layering within the restoration.

Amalgam must be condensed forcefully into every part of the cavity preparation by successive thrusts with instruments so shaped that they will reach into every part of the cavity. Otherwise voids and mercury rich pockets will be left. A diamond shaped instrument, such as the one developed by Hollenback, is best for reaching the important buccal and lingual margins of a Class II cavity (Fig. 18). A small instrument which will condense the amalgam into the proximal locks of this cavity is important. A cavity with an odd shape should be tested by the insertion of condensers in order to judge the accessibility of every portion.

Both the manufacturers and the profes-

13. Schoonover, I. C.; Souder, Wilmer, and Beall, J. R. Excessive expansion of dental amalgam. J.A.D.A. 29:1825 (Oct.) 1942.

14. Skinner, E. W. The science of dental materials, ed. 3. Philadelphia, W. B. Saunders Co., 1946, p. 329, 330.

sion have shown much interest in mechanical condensers for amalgam. The merit of machine technic for condensing amalgam, however, is questionable.

There are two general types of mechanical amalgam condensers. One strikes a blow as for gold foil, while the other carries a vibrating point. The first type habitually injures enamel margins. All mechanical condensers tend to continue trituration, reducing alloy particle size which may result in a shrinking filling. The specifications of the Council on Dental Research of the Association for amalgam call for an alloy which expands slightly, between 3 and 13 microns per centimeter at the end of 24 hours. This is necessary because amalgam has a very high coefficient of expansion, almost three times that of tooth structure. In the range between hot and cold foods, amalgam expands and shrinks enough to cause leakage unless a setting expansion has locked it tightly into the dentin.[15] Leakage around a filling causes characteristic "blue margins," and may result in recurrent caries.

Hand condensation will dependably pack amalgam without these hazards. Almost any operator can develop enough hand pressure to do it well with medium and small condenser points.[16] As each new portion of amalgam is added, several 10 pound thrusts should first be made to weld the new mass to the mercury-rich surface of the preceding mass. Then the condenser point is stepped toward the margins with five or six pound thrusts, which will closely adapt the amalgam to the cavity and reduce mercury content sufficiently to produce a durable restoration. Mercury excess coming to the surface during condensation is flipped out with the condenser point. It is likely that if the operator's arm does not ache after condensing a large filling, the filling is not well condensed. Household scales can be used to test hand pressures, pressing a condensing instrument to the platform with various instrument grasps.

FINISHING

All amalgam fillings should be built to an excess of a full millimeter or more because the top portion is never so well condensed as the part underneath. Carving back to contour will then leave thoroughly condensed amalgam on the surface of the finished restoration.

A well condensed filling of quick setting alloy can be carved immediately. With a slow setting alloy the operator should wait for from three to five minutes. Carving should not be started until the amalgam is set enough to resist carving. It will give forth a ringing sound in the process. A sharp instrument should be used to cut amalgam and the cutting should never be done in the direction of filling to enamel because that brings mercury to the margin. A dull carver will burnish rather than cut and in doing so will disturb surface crystallization, bringing mercury to the surface. It may open a margin by distorting the entire mass. A slight excess of amalgam should be left on all carved surfaces except where it would cause actual occlusal interference. This leaves excess material for subsequent dressing and polishing. Areas built next to the smooth matrix need no carving and little polishing. If the matrix fitted the gingival, buccal, and lingual margins closely, these margins should not be touched until the polishing appointment at which time a sharp gold knife will readily remove the slight excess. If a faulty matrix allows considerable marginal excess, most, but not all, should be removed at the filling appointment. A completely carved margin leaves no excess for trimming and polishing at a latter time. Carving actually picks out alloy particles from the crystallizing mass, leaving a rough, undercut surface. Subse-

15. Skinner, E. W. The science of dental materials, ed. 3. Philadelphia, W. B. Saunders Co., p. 305.

16. Black, A. D. G. V. Black's work on operative dentistry, vol. II, ed. 7. Chicago, Medico-Dental Publishing Co., 1936, p. 207.

Fig. 16 • Showing matrix tied about an upper molar for mesiooccclusal and disto-occlusal cavities. Hardwood wedges are forced into the proximal below the gingival margin. A hemostat forceps provides easy means for insertion and withdrawal

Fig. 17 • Matrix has been stabilized with four blocks of green stick compound forced through the interproximal spaces. A warmed burnishing instrument is used as shown to contour the matrix to tooth form. Compound can be seen flowing out from under the matrix band. Ligature ends are usually slipped into one of the rubber dam clamp jaws. If they were cut short, one might be forgotten and left under the free margin of the gum to cause injury and invite infection

Fig. 18 • Amalgam condensing instruments must be used which can and are made to reach every part of the cavity. Here the essential diamond shaped condenser is shown to fit the corners where matrix meets buccal and lingual margins

quent contouring and polishing removes the excess which has been deliberately left. The resulting surface is made up of polished facets of unamalgamated alloy particles which retain a polish and resist corrosion. The surface can be likened to that of the polished marble chips forming the durable finish of a terrazzo floor. The Portland cement binder holds the marble particles together much as amalgam binds the alloy filings. The better the condensation, the less of the weaker binding material.

Schoonover and Souder showed that even well condensed amalgam fillings will corrode if they are not smooth at the margins and polished.[9,17] It is best to defer polishing for several days although a satisfactory result may be obtained after 24 hours. Carved surfaces are dressed with sharp round burs and finishing burs. Margins are perfected with a sharp gold knife. Wet pumice on bristle brushes fol-

17. Skinner, E. W. The science of dental materials, ed. 3. Philadelphia, W. B. Saunders Co., 1946, p. 327.

lowed by wet whiting or rouge will remove scratches and leave a high polish. Heat from polishing will quickly ruin an amalgam filling. The critical temperature is only 140°F.[18] Therefore only very wet polishing agents should be used to reduce the hazard of heat.

Deep occlusal grooves should not be carved into amalgam fillings, for deep grooves weaken the restoration and subject margins to chipping (Fig. 3). Otherwise tooth form should be faithfully restored. Embrasure form is very important. It should be remembered that the contact area is a millimeter or more removed from the height of the marginal ridge. Dentists have been so accustomed to condensing fillings into plane surface matrixes that they have come to think of the interproximal surfaces as being straight lines with the contact at the crest of the marginal ridge. Normal contacts should be studied in interproximal roentgenograms. It is well to remember that marginal ridges do not occlude necessarily and that proper embrasures provide important sluice-ways for food, relieving excessive hydraulic pressure which is created in chewing food and which traumatizes a tooth.

It can be truthfully said that an amalgam filling is usually much better than it looks, while a gold inlay is seldom as good as it looks. Amalgam fillings resist recurrent caries at their margins, while most gold inlays invite marginal caries which progresses rapidly. The reason is that with amalgam and gold foil, the fit of metal to enamel seals the tooth more dependably than the cement seals a gold inlay, which all too frequently has a marginal discrepancy somewhere.

Because good restorations of silver amalgam yield a service highly commensurate to the effort expended, the dentist who perfects himself in the technic should receive adequate compensation. Certainly he is entitled to the same hourly return that he would derive from gold restorative service.[19]

CONCLUSION

Amalgam restorations can be so good that they are well worth the extra effort necessary to make them good. Amalgam fillings can be built consistently which will serve from 15 to 20 years or more.

The lasting results possible with good restorations of silver amalgam help the profession to meet the demand for dental care without the danger of pricing our professional services beyond the reach of the public.

632 Republic Building

18. Souder, Wilmer, and Paffenbarger, George C. Physical properties of dental materials, circular 433, U.S. Department of Commerce, Washington, National Bureau of Standards, 1942, p. 15.

19. Black, G. V. Operative dentistry, vol. II, ed. 4. Chicago, Medico-Dental Publishing Co., 1920, p. 329.

Joy of Life • This is the true joy of life, the being used for a purpose recognized by yourself as a mighty one; the being thoroughly worn out before you are thrown on the scrap heap; the being a force of nature instead of a feverish selfish little clod of ailments and grievances complaining that the world will not devote itself to making you happy. *George Bernard Shaw, "Man and Superman."*

Effectiveness of a chewing gum containing nitrofuran in the prevention of dental caries

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In 1944, Dodd and Stillman[1] demonstrated that certain furan derivatives containing a nitro group in the 5 position inhibited the growth of a large number of pathogenic bacteria. *In vivo* studies showed that the antibacterial power of the nitrofurans was greatly enhanced by the presence of a semicarbazone or closely allied grouping in position 2 in the furan ring.[2] Green[3] found that the nitrofurans exert their effect by preventing microorganisms from dissimilating glucose and related substances essential to their nutrition. The mechanism of action is an interference with the ability of susceptible microorganisms to utilize some of the B group of vitamins, notably thiamin and nicotinic acid. Thiamin and nicotinic acid are essential for the maximum growth of the oral *Lactobacillus acidophilus*, the organism most commonly associated with the initiation of human dental caries. As constituents of coenzymes, thiamin and nicotinic acid are involved in the bacterial degradation of glucose to acids capable of dissolving tooth structure. It appeared, therefore, that the nitrofurans might be of value in the prevention of human dental decay.

Accordingly, 10 nitrofurans[4] were screened for their relative potency as inhibitors of acid production in saliva and of the growth and acid production of an oral strain of *L. acidophilus* cultured in a synthetic medium. Of those tested, 5-nitro-2-furaldehyde 2 (2 hydroxyethyl) semicarbazone, or Furadroxyl, was found to be most effective as an inhibitor of dental caries activity when added *in vitro*.[5] When added *in vivo*, Furadroxyl maintained its inhibitory effect in the presence of the tissues and fluids of the oral cavity.[6]

Furadroxyl is a yellow crystalline compound with a melting point of 214° to 216° C. It is soluble in water to the extent of 1,264 mg. per liter. When fed to rats by oral administration, a fairly large percentage is excreted unchanged in the

Northwestern University studies in nutrition at the Hillman Hospital, Birmingham, Ala. From the department of nutrition and metabolism, Northwestern University, Chicago. This study was supported by grants from the Eaton Laboratories, Norwich, N. Y.

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1. Dodd, M. C., and Stillman, W. B. The in vitro bacteriostatic action of some simple furan derivatives. J. Pharmacol. & Exper. Therap. 82:11 (Sept.) 1944.

2. Dodd, M. C. The chemotherapeutic properties of 5-nitro-2-furaldehyde semicarbazone (Furacin). J. Pharmacol. & Exper. Therap. 86:311 (April) 1946.

3. Green, M. N. Studies on the mechanism of Furacin (5-nitro-2-furaldehyde semicarbazone). Federation Proc. 7:305, 1948.

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6. Dreizen, S.; Greene, H. I., and Spies, T. D. Effect of in vivo addition of selected nitrofurans on acid production in human saliva. Proc. Soc. Exp. Biol. & Med. 70:558, 1949.

Table 1 • Age and sex distribution of the subjects in each group

Groups (sex)	Age distribution (years)							Total
	5–10	11–15	16–20	21–25	26–30	31–35	36–40	
Group 1								
Male	3	5	1	0	2	2	0	13
Female	1	6	5	0	1	2	2	17
Total	4	11	6	0	3	4	2	30
Group 2								
Male	3	4	1	2	0	1	0	11
Female	0	5	4	2	1	2	0	14
Total	3	9	5	4	1	3	0	25
Group 3								
Male	2	6	1	0	0	0	0	9
Female	3	6	4	1	0	2	0	16
Total	5	12	5	1	0	2	0	25

urine along with a small amount of resins and other decomposition products.[7]

The LD_{50}[8] of Furadroxyl is 430 mg. per kilogram and its LD_0[9] is 200 mg. per kilogram.[10] In the amounts used in the preliminary experiments as an inhibitor of dental caries activity, Furadroxyl was stable, nonirritating and nontoxic. In view of these findings it seemed desirable to test clinically the dental caries-preventive potential of Furadroxyl.

MATERIALS AND METHODS

Eighty volunteers were selected for this study. Each had clinical, roentgenographic and laboratory evidence of active dental caries at the time of selection. The subjects ranged in age from 6 to 38 years. Thirty-three were males and 47 were females. All were white and, with few exceptions, natives of north central Alabama.

The 80 subjects were arbitrarily divided in three groups. Group 1 included 30 persons ranging in age from 6 to 38 years, each of whom chewed one stick of specially prepared gum which contained Furadroxyl after each meal. Each stick of gum weighed approximately 3 Gms. and contained from 7.0 to 7.5 mg. of Furadroxyl. Group 2 included 25 persons ranging in age from 8 to 35 years, each of whom chewed one stick of a specially prepared gum but not containing Furadroxyl after each meal. Group 3 included 25 persons ranging in age from 7 to 35 years who did not chew any type of gum routinely after each meal. Groups 2 and 3 served as the control groups. The age and sex distribution of the persons in each group are shown in Table 1. The members of Groups 1 and 2 were instructed to begin chewing the gum within four minutes after the completion of a meal and to continue this procedure for at least 10 minutes. The nature of the study was outlined to each participant and great stress was placed on the need for individual cooperation.

The composition of the two types of specially prepared gum was identical except for the presence or absence of Furadroxyl. Each was comprised of gum base (chicle), 38.3 per cent; sorbitol, 53.3 per

7. Paul, H. E., and others. Metabolism of the nitrofurans. I. Ultraviolet absorption studies of urinary end products after oral administration. J. Biol. Chem. 180:345 (Aug.) 1949.

8. Causing death in 50 per cent of the objects tested.

9. Causing no deaths among the objects tested.

10. Stillman, W. B. Personal communication.

cent; mannitol, 5.0 per cent; peppermint flavoring, 1.3 per cent, and softeners, 1.1 per cent. The softeners consisted of equal amounts by weight of pure paraffin wax and a lecithin made from soybeans.

The study began in August, 1949, and continued through August, 1950. The degree of carious involvement in each member of each group was determined by a clinical and roentgenographic examination. The clinical examination was made with a mouth mirror, sharp half round exploring tine and chip blower. The subject was seated in a dental chair and an overhead operating lamp served as the source of illumination. Full mouth intraoral roentgenograms were taken in every instance. A magnifying glass and an illuminator were used to examine the roentgenograms. Clinical and roentgenographic findings were charted on a special form for each subject. The examination was repeated in its entirety by the same examiner at the end of the 12 month experimental period.

Each subject was seen in the clinic at least once every three weeks throughout the period of study. During these visits, the experimental gum was allotted, dental caries activity determinations were made, and the subjects in Groups 1 and 2 were questioned and examined for evidence suggestive of hypersensitivity to the ingredients of the gum. At no time throughout the course of the study was any attempt made to change the dietary or oral hygiene habits of any of the participants.

OBSERVATIONS

The total number of teeth present in each group at the beginning of the study was 802 in Group 1, 671 in Group 2 and 658 in Group 3. Group 1 had 352 anterior teeth and 450 posterior teeth, Group 2, 294 anterior and 377 posterior teeth, and Group 3, 295 anterior and 363 posterior teeth. The mean number of teeth per subject was 26.7 in Group 1, 26.8 in Group 2 and 26.1 in Group 3. Three hundred and fifty-seven teeth (71 anterior and 286 posterior) in Group 1, 308 teeth (49 anterior and 259 posterior) in Group 2, and 263 teeth (42 anterior and 221 posterior) in Group 3 contained evidence of carious involvement. The number of teeth affected by dental decay was equal to 44.5 per cent of the total in Group 1, 45.9 per cent of the total in Group 2, and 40.1 per cent of the total in Group 3. The mean number of teeth per subject affected by dental decay was 11.9, 12.3 and 10.5 in Groups 1, 2, and 3, respectively. These findings are shown in Table 2.

In Table 3, the type of carious involvement has been compiled on the basis of DMF teeth (decayed-missing-filled teeth) since many of the teeth in each group contained both a restoration and an unfilled carious lesion. Group 1 had a total of 426 DMF teeth with an average per subject of 14.2 DMF teeth. Of these, 5.6 were decayed, 0.7 missing, and 7.9 filled. Group 2 had a total of 354 DMF teeth. The mean per subject of 14.2 DMF teeth was comprised of 4.8 decayed, 0.1 missing and 7.5 filled. In Group 3 the total number of DMF teeth was 305 with a mean per subject of 12.2, of which 5.0 were decayed, 0.3 missing and 6.9 filled.

When tabulated on the basis of four caries-susceptible surfaces per anterior tooth and five caries-susceptible surfaces per posterior tooth (Table 4), it was observed that Group 1 contained 3,658 tooth surfaces, Group 2, 3,046 tooth surfaces and Group 3, 2,995 tooth surfaces. The average number of surfaces per individual was 122.6 in Group 1, 121.4 in Group 2 and 119.8 in Group 3. The surfaces affected by dental caries at the beginning of the study were 784 (21.4 per cent) in Group 1, 586 (19.2 per cent) in Group 2 and 499 (16.7 per cent) in Group 3. An average of 26.1 surfaces per individual in Group 1, 23.4 in Group 2 and 20.0 in Group 3 showed evidence of carious involvement.

The number of DMF tooth surfaces are

Table 2 • The number of carious and noncarious teeth present in each group at the beginning of the study

Teeth	Group 1	Group 2	Group 3
Number of teeth			
Anterior	352	294	295
Posterior	450	377	363
Total	802	671	658
Average per individual	26.7	26.8	26.1
Number of carious teeth			
Anterior	71	49	42
Posterior	286	259	221
Total	357	308	263
Average per individual	11.9	12.3	10.5
Per cent of carious teeth			
Anterior	20.2	16.7	14.2
Posterior	63.6	68.7	60.9
Total	44.5	45.9	40.1

Table 3 • The decayed, missing* and filled teeth present in each group at the beginning of the study

Teeth	Group 1	Group 2	Group 3
Decayed teeth			
Total per group	167	119	125
Average per individual	5.6	4.8	5.0
Missing teeth			
Total per group	22	3	8
Average per individual	0.7	0.1	0.3
Filled teeth			
Total per group	237	232	172
Average per individual	7.9	7.5	6.9
DMF teeth			
Total per group	426	354	305
Average per individual	14.2	14.2	12.2

*Includes only those teeth extracted because of extensive decay.

presented in Table 5. The total DMF tooth surfaces in Group 1 was 796 as compared to 586 in Group 2 and 499 in Group 3. The average number per individual was 26.5 (7.2 decayed, 3.5 missing and 15.8 restored) in Group 1, 23.44 (5.6 decayed, 0.6 missing and 17.2 restored) in Group 2 and 20.0 (6.5 decayed, 1.4 missing and 12.0 restored) in Group 3.

The dental caries attack rate during the 12 month period of study is shown in Table 6. The total number of new carious tooth surfaces was 25 in Group 1, 82 in Group 2 and 106 in Group 3. The average number of new carious tooth surfaces per individual was 0.87, 3.3, and 4.2 for Groups 1, 2 and 3, respectively. Dental caries developed in 23 teeth in Group 1, 75 teeth in Group 2 and 96 teeth in Group 3. Of these, 9 teeth in Group 1, 26 teeth in Group 2 and 40 teeth in Group 3 had been free from evidence of dental decay at the beginning of the study. The average number of new carious teeth in the members of the three groups during the 12 month experimental period was: Group 1, 0.77; Group 2, 3.0; and Group 3, 3.8. Of these, an average of 0.3 in Group 1, 1.0 in Group 2, and 1.6 in Group 3 had been free from decay prior to August, 1949.

The 25 new carious surfaces in Group 1 constitutes 0.87 per cent of the total number of tooth surfaces which had been free from dental decay at the beginning of the study. The corresponding percentages for new carious surfaces in Groups 2 and 3 were 3.3 per cent and 4.2 per cent, respectively. These percentages were compared and subjected to statistical analysis by dividing the observed difference in per cent by the standard error of difference between the observed percentages.[11] It was found that the deviation between the percentages of Group 1 and Group 2 equaled 5.7 sigmas, of Group 1 and Group 3, 7.7 sigmas, and of Group 2 and Group 3, 1.68 sigmas. Deviations of 2 or more sigmas are regarded as being statistically significant since such an occurrence is unlikely to be due to chance.

The 23, 75 and 96 teeth which decayed during the experimental period equaled 2.8 per cent, 11.2 per cent and 14.2 per cent of the total number of teeth present in Groups 1, 2 and 3, respectively. The deviation between the percentages undergoing decay in Group 1 and Group 2 was

11. Gafafer, W. M. Measurement and comparison of dental caries experience. J. D. Res. 21:443 (Oct.) 1942.

6.22 sigmas, that between Group 1 and Group 3 was 7.87 sigmas and that between Group 2 and Group 3 was 1.84 sigmas. The 9 completely new carious teeth in Group 1 constituted 2.0 per cent of the total number of caries free teeth present at the beginning of the study. The corresponding percentages for Groups 2 and 3 were 7.2 per cent and 10.1 per cent respectively. On analysis, the deviation between the percentages of Groups 1 and 2, Groups 1 and 3 and Groups 2 and 3 equaled 3.4, 4.9 and 1.46 sigmas, respectively.

The distribution of the new carious lesions which developed during the 12 month experimental period is shown in Table 7. Eighteen (60 per cent) of the members of Group 1 did not develop any new carious lesions while chewing the gum containing Furadroxyl as compared to 7 (28 per cent) of those who chewed the specially prepared gum without Furadroxyl and 2 (8 per cent) of those who did not chew either of the two types of gum after each meal. The maximum number of new lesions per individual was 6 in Group 1, 14 in Group 2 and 19 in Group 3.

No evidence suggestive of hypersensitivity to Furadroxyl or any of the other ingredients of the specially prepared gum was encountered during the period of study. Blood and urine examinations made at intervals on 9 subjects, taken at random, who chewed the gum containing Furadroxyl did not reveal any evidence of abnormality.

DISCUSSION

Recent evidence indicates that dental caries formation is an intermittent rather than a continuous process and that the greatest degree of activity occurs in the 30 minute period immediately following the ingestion of a meal containing fermentable carbohydrates.[12] In this study, it has been shown that the postprandial use of a chewing gum containing Furadroxyl during the peak periods of dental caries activity significantly reduced the incidence of new dental decay in persons highly susceptible to dental caries. Only 25 new carious lesions developed in a group of 30 persons who chewed the

12. Stephan, R. M. Intra oral hydrogen-ion concentrations associated with dental caries activity. J. D. Res. 23:257 (Aug.) 1944.

Table 4 • The number of carious and noncarious tooth surfaces* in each group at the beginning of the study

Surfaces	Group 1	Group 2	Group 3
Number of tooth surfaces			
Anterior	1,408	1,176	1,180
Posterior	2,250	1,870	1,815
Total	3,658	3,046	2,995
Average per individual	122.6	121.4	119.8
Number of carious surfaces			
Anterior	113	64	58
Posterior	671	522	441
Total	784	586	499
Average per individual	26.1	23.4	20.0
Per cent of carious surfaces			
Anterior	8.0	5.4	4.9
Posterior	25.4	27.9	24.3
Total	21.4	19.2	16.7

*In this evaluation each anterior tooth is equivalent to 4 surfaces and each posterior tooth to 5 surfaces.

Table 5 • The decayed, missing* and filled tooth surfaces† present in each group at the beginning of the study

Surfaces	Group 1	Group 2	Group 3
Decayed tooth surfaces			
Total per group	216	141	163
Average per individual	7.2	5.6	6.5
Missing tooth surfaces			
Total per group	106	15	36
Average per individual	3.5	0.6	1.4
Filled tooth surfaces			
Total per group	474	430	300
Average per individual	15.8	17.2	12.0
DMF tooth surfaces			
Total per group	796	586	499
Average per individual	26.5	23.4	20.0

*Includes only those teeth extracted because of extensive decay.

†In this evaluation, each anterior tooth equaled 4 surfaces and each posterior tooth equaled 5 surfaces.

Table 6 • Dental caries attack rate in each group during the 12 month experimental period

Teeth and surfaces	Group 1	Group 2	Group 3
Number of new carious teeth			
Total per group	23	75	96
Average per individual	0.8	3.0	3.8
Number of new carious surfaces			
Total per group	25	82	106
Average per individual	0.87	3.3	4.2

gum containing Furadroxyl after each meal during a 12 month experimental period as contrasted to 82 new lesions in a group of 25 persons who chewed a gum not containing Furadroxyl and 106 new lesions in a group of 25 persons who did not chew any gum routinely after each meal. The number of new carious lesions per individual in the group which chewed the gum not containing Furadroxyl and in the group which did not chew either of the specially prepared gums exceeded that of the group which chewed the gum containing Furadroxyl by 75 per cent and 80 per cent, respectively. Since the caries increase in the persons who chewed the gum containing Furadroxyl was significantly lower than in the persons comprising the two control groups, it would appear that the Furadroxyl lowers the incidence of new dental caries.

There was no significant statistical difference between the caries increments in Groups 2 and 3 despite the routine use of the gum not containing Furadroxyl by the members of Group 2. Volker[13] has reported that although the chewing of commercial gum removes an average of 80 per cent of the residual oral debris, it is without effect on the incidence of dental caries.

SUMMARY AND CONCLUSIONS

1. The postprandial use of a specially prepared chewing gum containing 7.0 to 7.5 mg. of Furadroxyl (5-nitro-2 furaldehyde 2 (2 hydroxyethyl) semicarbazone) as a possible dental caries-preventive agent has been subjected to clinical trial.

13. Völker, J. F. The effect of gum chewing on the teeth and supporting structures. J.A.D.A. 36:23 (Jan.) 1948.

Table 7 • The distribution of the carious lesions which developed during the 12 month experimental period

Number of new carious lesions	Group 1		Group 2		Group 3	
	Number of subjects	Per cent of total	Number of subjects	Per cent of total	Number of subjects	Per cent of total
0	18	60	7	28	2	8
1	6	20	1	4	3	12
2	2	6.7	4	16	3	12
3	3	10	4	16	6	24
4	0	0	5	20	3	12
5	0	0	5	20	3	12
6	1	3.3	0	0	0	0
7	0	0	0	0	1	4
8	0	0	1	4	1	4
9	0	0	1	4	2	8
10	0	0	1	4	0	0
14	0	0	1	4	0	0
19	0	0	0	0	1	4

2. The use of the chewing gum containing Furadroxyl after each meal during a 12 month experimental period by a group of 30 caries-susceptible subjects resulted in a significant reduction in the incidence of new dental decay as contrasted to the amount of new decay in two control groups each consisting of 25 caries-susceptible subjects.

3. The dental caries attack rate in the group who used the gum containing Furadroxyl during the experimental period was 75 per cent lower than that of the control group which used a gum similarly prepared but not containing Furadroxyl and 80 per cent lower than that of the control group which did not use any gum routinely after each meal.

4. Sixty per cent of the persons who chewed the gum containing Furadroxyl did not develop any new carious lesions during the 12 month experimental period as contrasted to 7 per cent of those who chewed the gum not containing Furadroxyl and 2 per cent of those who did not chew either of the types of gum after each meal.

5. Because of the relatively small number of patients included in this study, these findings must be considered as preliminary in nature. They indicate, however, that a sugar-free chewing gum containing Furadroxyl may be of value in the prevention of human dental caries.

Mechanical principles of operative dentistry

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Dentistry's chief function is the maintenance, repair and replacement of the dental organs. It is generally accepted as fact that good operative dentistry performed early is the most efficacious means of maintaining oral health and function. In this and in the field of prosthetics, American dentistry is preeminent. It has reached this preeminence through the mechanical ingenuity of the dentist and as a result of much experimentation. The question should now be asked whether this method of trial and error is sufficient.

In most fields of human endeavor the method is by trial and error in the early stages of their development. However, after the accumulation of a certain amount of empirical knowledge, inquiring minds want to know the reason for the failures and how the successes may be made more successful. Here research, knowledge from other fields, analysis and synthesis answer the questions what, why when, how.

American dentistry has already begun this process in some of its parts. The use of radioactive isotopes in studies of growth and development, and the advanced researches in dental materials are examples. However, in the design of structures for replacement or repair the dentist is still using the trial and error method combined with misconceptions of a few fundamental mechanical principles.

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There is no need for these misconceptions, for the field of Newtonian mechanics is one of the oldest and best understood. It is not necessary that the dentist work out mathematical designs of his structures as an engineer does; as a matter of fact this would be a more difficult job than any facing the engineer. It is necessary, however, that he understand the mechanical principles involved in his treatments so that he does not violate mechanical laws which would result in not only failure of his treatment, but frequently, more harm to the patient than if treatment had not been attempted.

It must be recognized that the masticatory apparatus is a machine in the strict sense of the word. It uses the force of contraction of the muscles of mastication to comminute food. It transforms this force, which is tensile at its points of application, to compressive and shearing forces at their points of utilization, the bolus of food. This it does by means of a lever, the mandible, and inclined planes, the cusps and ridges of the teeth.

As in any other machine, the forces are transmitted from one part of the machine to another by means of stresses within it. The muscles exert tensile forces at their points of origin on the skull and at their points of insertion in the mandible. From here the forces are transmitted along the body of the mandible as bending stresses and through the periodontal membranes of the functioning teeth to the teeth themselves as compressive stresses. Here they are converted into compressive and shearing forces by the inclined planes formed by ridges and cusps.

As in any machine, if the stresses exceed certain values something happens to the overstressed parts. Inanimate materials are either permanently distorted or broken. This may happen in a restoration or even in the hard structures of the teeth themselves. In living structures disease results, as in the breaking down of the supporting structures of the teeth.

One of the most important functions of the dentist is to keep these stresses in any part of the masticatory apparatus within safe limits. This in its more complicated form is a problem in biomechanics and, in its simplest form, of plain mechanics.

CONTROL OF MECHANICAL FACTORS

In the restoration of lost tooth structure the chief control of the mechanical factors is by the cavity design. The manner in which the restored tooth is to function and the nature and extent of the damage determine this design. A consideration of what takes place at the occlusal surfaces of the teeth is therefore necessary.

The relation of the inclined planes, the cusps and ridges, presents the most fundamental problem in dentistry because they cause the lateral forces that dislodge restorations and damage the supporting tissues of the teeth.

Cusp to Cusp Contact • If a point on a cusp of a mandibular tooth makes forcible contact with the slope of a cusp of a maxillary tooth under the vertical pull of the muscles of mastication, the maxillary cusp must react with an equal vertical force. But, if friction is neglected, the maxillary cusp can react only at right angles or normal to its slope. This requires that another force be applied to the mandibular tooth so that this force plus the vertical force give a resultant which is equal and opposite to the reacting force of the maxillary tooth. This is shown in Figure 1 where M is the force of mastication, N the formal force of reaction and H the second force which has to be added. Note that H and M give a resultant equal and opposite to N. This second force H is applied through the alveolar bone as a lateral or horizontal force. Incidentally, it is this force which, when too large, is responsible for much periodontal disease. It should be perfectly clear, also, that the normal reacting

force of a maxillary tooth is the resultant of a vertical and a horizontal force equal and opposite to M and H respectively.

An idea of the magnitude of the force may easily be grasped. If the masticatory force at the point of contact is known, it, multiplied by the ratio of the height of the slope of the cusp to its base, would give the lateral force. For example, for a slope of 30 degrees the height is approximately 64/100 of the base, so for a biting force of 100 pounds the lateral force would be 64 pounds. For a 45 degree angle the forces would be equal. These values can readily be obtained by drawing the slope at the correct angle and drawing the base to scale equal to the masticatory force. Complete the right triangle and scale the vertical side.

From this it is obvious that overaccentuating cusps and ridges may seriously damage the supporting structures, particularly where, as in older individuals, there has been some resorption.

It has been assumed that the cusp slopes are planes. This is nearly the case for worn cusps. For unworn cusps the slope would be determined by the angle a tangent to the cusp at the point of contact makes with the horizontal as shown in Figure 1.

Friction has been neglected. It is variable for different types of surfaces in contact and for different lubricants, for example, food and saliva. However, it is probably not great and its effect is to reduce the lateral force.

Two Cusp Contact • If an opposing cusp contacts two cusps, or a cusp and a ridge, the force of the bite is divided between the two points and the opposing horizontal forces are half as great as where there is only one point of contact. This is shown in Figure 2. It is this wedging force which is of concern in the retention of the proximoocclusal restoration since if one point of contact is on the tooth and the other on the restoration there is a tendency to wedge them apart.

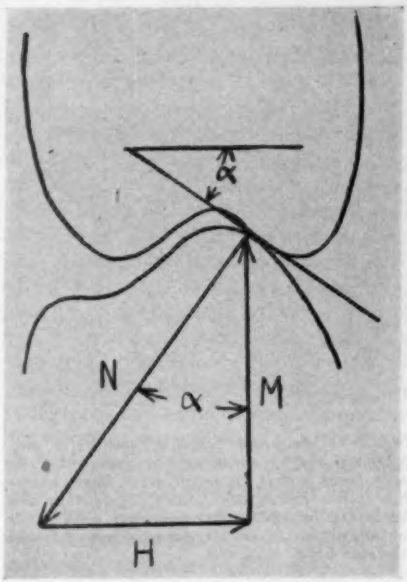

Fig. 1 • Cusp to cusp contact. The angle α is the slope of the cusp in degrees at the point of contact, M the force of mastication, N the force of reaction perpendicular to the slope and H the horizontal force necessary to balance the horizontal component of N

Black pointed out the necessity for an occlusal lock on this type of cavity. Attempts to conserve tooth structure by obtaining retention by means of the buccal and lingual walls without extending the cavity beyond the axial wall will frequently result in failure. Mechanical analysis[1] shows that the stresses set up in some parts of the tooth and restoration may run into many thousands of pounds per square inch. This results from the fact that the lever arm of the retaining force is much smaller than that of the displacing force and that the direction of the retaining force is such that only a small part of it is effective.

1. Gabel, A. S. American textbook of operative dentistry, ed. 8. Philadelphia, Lea & Febiger, 1947, p. 660.

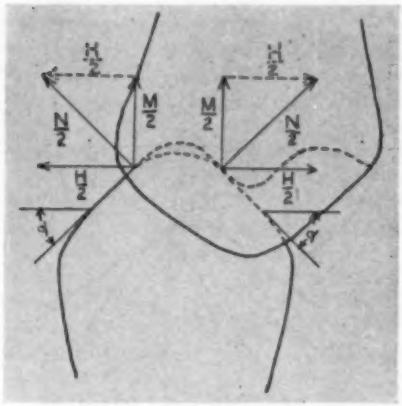

Fig. 2 • Two point (cusp to transverse and marginal ridge) contact. The force M/2 at each point is half the masticatory force, therefore other forces are halved. Note that the horizontal components counteract each other so that no horizontal force is transmitted to the alveolar bone

Retention of Occlusal Dovetail • This may be overcome by cutting an occlusal dovetail. In this instance, as seen in Figure 3, which for simplicity shows only one point of contact, the lever arms r and r′ are nearly of the same length and the retaining force R is in the proper direction to be the most effective.

The placing of an occlusal dovetail introduces a new difficulty. So far only lateral forces have been discussed, but consider the vertical force when a point contact is made near the free end of the dovetail or the loading is distributed, as when eating tough meat. If the dovetail were unsupported by dentin it would behave like a cantilever beam, assuming the proximal part to be retained by undercuts, and would probably break at the axiopulpal line angle due to bending since the stresses are greatest here.

How much the dentin supports the dovetail depends on the relative stiffness or the moduli of elasticity of the dentin and the restorative material and the size of the pulp chamber. If the restorative material is much stiffer; that is, has a much greater modulus of elasticity than the dentin, it carries more than its share of the load and so may fracture. Again, if the dovetail extends over a large pulp chamber the pulpal floor may not give sufficient support to the dovetail. Figure 4 illustrates these conditions. Note that the dentin is compressed more than the restorative material due to the latter's greater modulus of elasticity. This applies particularly to the deciduous teeth, whose dentin has a low modulus of elasticity and whose pulp chambers are usually large.

For increased strength the isthmus connecting the dovetail to the proximal portion of the cavity should be deepened rather than widened, since the strength varies directly as the square of the depth but only as the first power of the width. In other words, if the depth is doubled the strength is quadrupled, but if the width is doubled the strength is only doubled. The increase in depth or width should be greatest at the axiopulpal line angle since, as was mentioned previously, the stresses are greatest here.

Under a steady biting force the thickness and width of the occlusal portion away from the proximal part is of no

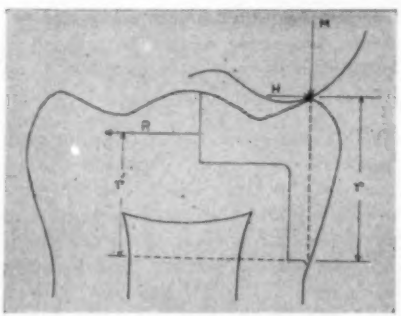

Fig. 3 • Retention of occlusal dovetail. Retaining force R is to displacing force H as lever arm r is to lever arm r′ since torque Rr′ equals torque Hr. (The forces are not drawn to scale)

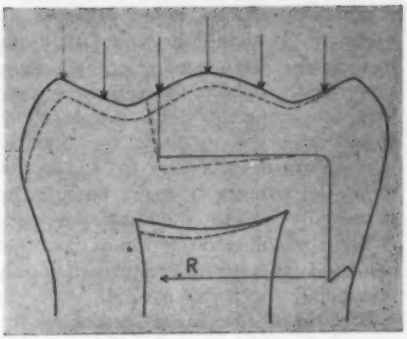

Fig. 4 • Bending of proximoocclusal restoration locked at gingival by retaining force R due to dentin being more compressible than the restorative material

importance as long as they are great enough, but under the intermittent force of chewing, additional bulk here throws a large part of its load on the isthmus. In other words, excessive bulk in the occlusal dovetail increases the stresses in the isthmus. This results from the fact that during the act of applying a force, work is being done, because the force is producing a distortion. The work in any part of the structure is the average stress in this part times the strain or distortion. Now if the occlusal dovetail has too large a bulk the stress is reduced and also the strain. Therefore, some of the work of taking up the load that it should have absorbed is passed on to the weaker part of the structure, in this case, the isthmus. Since, as was mentioned previously, the bending stresses are greatest at the axiopulpal line angle and decrease toward the free end of the lock, the bulk should be greatest here and decrease toward the free end. The bulk of metal may be reduced by cement.

It is unfortunate that where the greatest depth is needed, that is at the axiopulpal line angle, there is the greatest danger of pulp exposure, particularly in young permanent and deciduous teeth. Fortunately the dental materials in use today are strong enough to withstand these stresses except frequently in the deciduous molars.

Locking of Inlay Restorations • Up to this point the discussion has been on the strength of the proximoocclusal restoration securely locked in the gingival portion. In the case of the inlay, strength is a minor consideration but the locking of the gingival portion is important and frequently overlooked. Inlay golds have a much higher modulus of elasticity than dentin and therefore the inlay has a strong tendency to bend or rotate at the axiopulpal line angle. If special provision for retention is not made it may tip out at the gingival, depending on the calcification of the dentin and the size of the pulp chamber. This can be prevented by sloping the gingival floor rootwise toward the axial wall, as shown in Figure 4.

This same procedure should also be carried out for the MOD inlay but for a different reason. When loaded, particularly near the middle, this inlay bends slightly with the concavity toward the occlusal. This tends to rotate the gingival portions out of the cavity, as shown in Figure 5. Friction and the slight adhesion of the cement may not be able to prevent

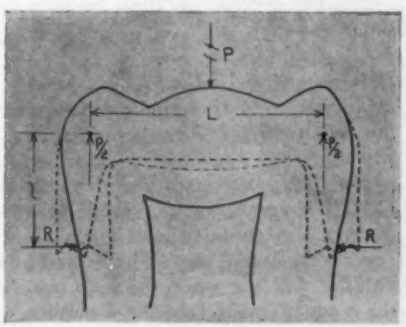

Fig. 5 • Displacement of gingival parts caused by bending MOD prevented by retaining forces R. Effectiveness of retention depends on R times L

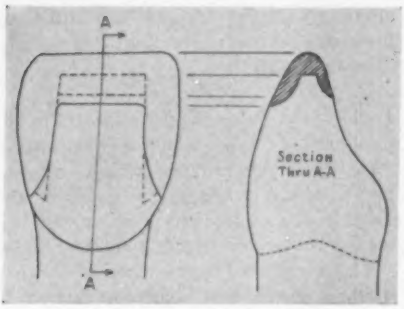

Fig. 6 • A method of restoring mandibular incisors with Class IV cavities. Note that incisal portion is not weakened by undercutting enamel and that incising force seats restoration more firmly

this; however, an increase in L decreases R.

The interproximal cavity in the anterior teeth usually presents no mechanical or biological problem except when the incisal edge is involved, when retention may present difficulties. Each case must be treated on its merit but one principle may be stated. Since normally, the thrust is labial on the maxillary and lingual on the mandibular teeth, a lingual lock may be used only on the maxillary. A labial lock, or some other type of retention in which the incising force does not tend to unseat the restoration, must be used on the mandibular teeth.

Restoring Class IV Cavities in Mandibular Incisors • The mandibular incisors are not usually involved but occasionally extensive caries may involve both incisal angles. The undercut incisal retention (MID) restoration is impossible because of the extremely small labiolingual thickness on the incisal edge. The lingual lock (MLD) will not retain the restoration if the teeth function. In quite a number of instances, the writer has successfully restored these teeth with gold castings by preparing the mesial and distal surfaces as for an MID and then reducing the incisal surface with stones as shown in Figure 6. It should be noted that any incising force tends to seat the casting more firmly so that the cement is used only for luting. As with the MOD it seems advisable to slope the gingival floors inward. Esthetics is usually of minor importance as most patients do not usually show the mandibular incisors. A slight modification of this preparation has also been used successfully when only one incisal angle was involved.

Because of the lingual thrust on the mandibular incisors and a force in the same direction on the posterior teeth in the working bite, the inlay type of restoration on the labial or buccal surface may be contraindicated and a cavity with a definite undercut, such as may be used for amalgam or foil, may be required. This results from the fact that the tooth behaves as a vertical cantilever and tends to bend lingually, opening up the cavity. The amount of opening would depend[2] on the size of the cavity, particularly its depth, the size of the pulp chamber and the calcification of the tooth, being less for a small cavity and pulp chamber and a well calcified tooth.

Occlusal Restorations • The simple occlusal cavity, in most cases, offers few mechanical problems unless large. In this case the floor usually is rounded and a restoration placed on it has a tendency to rotate about a horizontal axis if loaded at a point near its periphery. If loaded over its center the stress is greatest over the deepest part; that is, where the dentin bridging the pulp chamber is thinnest, as shown in Figure 7. It has been calculated[3] that, for a cavity with a hemispherical base, the stress in the center is twice the average stress for a restoration with a flat floor. These difficulties may be largely

2. Gabel, A. B. American textbook of operative dentistry, ed. 8. Philadelphia, Lea & Febiger, 1947, p. 642.

3. Gabel, A. B. American textbook of operative dentistry, ed. 8. Philadelphia, Lea & Febiger, 1947, p. 655.

overcome by filling the central portion of the cavity with cement to a depth which will permit sufficient thickness of restorative material, allowing for carving, and then flattening the remaining dentin floor to the periphery of the restoration. This flat annular seat in the dentin will carry most of the load in both centric and eccentric loading and will give stability in the latter case.

FORCES ON CUSPS AND RIDGES

It was stated earlier that the "chief control of the mechanical factors is by the cavity design." However, from what has preceded, it is obvious that the manner of restoring cusps and ridges plays an important part, particularly as it relates to the supporting structures. It is just as obvious that proper axial contour and contact are necessary for the protection of the gingivae. It is not so obvious why, when these have been obtained, food, particularly stringy meats, continues to pack interproximally.

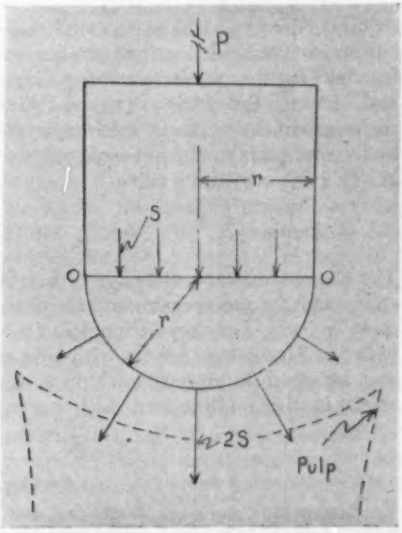

Fig. 7 • Section of centrically loaded occlusal restoration with hemispherical base. S is average stress across flat floor. Stress is zero where spherical surface joins cylindical surface and 2S at center of spherical surface

Fig. 8 • Forces acting on cusps and ridges. Horizontal components of forces a,b,c,d acting on 1, of e,f, acting on 2 and of m,n,o,p acting on 3 cancel out. Horizontal components of g and k push 2 and 3 apart; h has no horizontal component

This can be understood by referring to Figure 8 and assuming that the forces a to p are produced by biting on a bolus of tough meat. The horizontal components of forces b and c, f and g and n and o are acting on opposite sides of the transverse ridges of 1, 2 and 3 and neutralize each other, while those of d and e acting on the marginal ridges of 1 and 2 tend to push these teeth together.

On the other hand, the right hand marginal ridge of 2 being missing, force h has no horizontal component, while that of k acts to force 3 away from 2. It can also be seen that the four horizontal components on 1 cancel out. Those of f and g on 2 also cancel leaving the component of e to force 2 to the left since h has no horizontal component. The components of m, n, o and p cancel on 3 leaving the component of k to force 3 to the right.

It should be observed that the marginal ridges acting in pairs serve the same purpose as the transverse ridges. This is possible because the contact points are near the crests of the ridges. Were this not so the inclined interproximal surfaces would be forced apart by the wedging action of food. It is also clear why the proximating marginal ridges must be of the same height. There being no inclined planes on the well-worn teeth of the aged there is

no tendency to force the teeth apart.

The idea suggests itself that nature intended the occlusal surfaces of all the teeth of each jaw to act as one unit but was forced to the separate arrangement in order to provide masticating surfaces during the growth and development of the jaws.

In closing it should be pointed out that the variations in form, composition and physical and biophysical properties of the structures of the oral cavity contraindicate rigid rules of procedure for their maintenance, repair and restoration. Only an understanding of the fundamental principles involved, both biological and mechanical, can successfully cope with the many problems arising from these variations.

1310 Wyngate Road

Correct vertical dimension and freeway space

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The interval between the upper and lower teeth when the mandible is in the physiologic rest position is commonly known as the freeway space. Victor H. Sears has proposed the term "interocclusal space" as being more descriptive and specific; doubtless it will, in time, supplant the other term. The freeway space is now generally recognized as a normal and necessary feature of normal occlusal function. It not only characterizes the rest position of the mandible but also permits prolonged rest of the supporting structures of the teeth between periods of stress at meals. Thompson and Brodie[1, 2] have assembled evidence that encroachment upon the freeway space in the course of occlusal reconstruction or full denture restoration is destructive to alveolar bone; remaining teeth are intruded or ridges resorbed. The roentgenographic technic used in their research for registration of bony landmarks is too cumbersome and time consuming for practical use in prosthetic dentistry. Gillis[3] and Niswonger[4] have reported thoroughly simple and practical procedures for checking the physiologic rest position and, hence, the freeway space. With slight modification their method is directly applicable to daily clinical practice at negligible cost and trouble.

PROCEDURE

The patient must be seated at a height convenient for the operator and the chair must be level. Two small triangles of adhesive or Scotch tape are cut with scissors and attached to the patient's face, directly in the midline and with apexes

Assistant professor of dentistry, Columbia University, School of Dental and Oral Surgery.

1. Thompson, J. R., and Brodie, A. G., Factors in the position of the mandible. J.A.D.A. 29:725 (June) 1942.

2. Thompson, J. R., The rest position of the mandible and its significance to dental science, J.A.D.A. 33:151 (Feb.) 1946.

3. Gillis, R. R., Establishing vertical dimension in full denture construction. J.A.D.A. 28:430 (Mar.) 1941.

4. Niswonger, M. E., The rest position and centric relation. J.A.D.A. 21:1572 (Sept.) 1934.

Fig. 1 • Adjusting inside calipers to landmarks on nose and chin to register physiologic rest position. Back and headrest are removed

pointing toward each other; one on the tip of the nose, the other on the chin. A pair of inside calipers are adjusted approximately to the distance between the apexes of the two triangles.

The back and headrest of the chair are depressed so that the patient derives no support from them, and the patient is asked to sit comfortably erect, as on a backless chair. Removing artificial support makes the posture of the head and neck, and incidentally the intermaxillary relation, dependent only on normal muscle tonus, the equilibrium of opposing muscle groups. The calipers can now be readjusted to the distance between the apexes of the triangles on the nose and chin, and applied and adjusted repeatedly until a stable dimension is established. The patient may be asked to moisten the lips with the tongue or to sip a little water to induce slight mandibular movements, and thus the regularity of return to the tentative physiologic rest position identified by the caliper setting can be checked. This setting can be checked a dozen times in two or three minutes until the operator is convinced of its consistency. The vertical dimension can be preserved in the calipers (Fig. 1).

After the chair is readjusted so that the patient can lean back, he is asked to close to occlusion. With the teeth, or equivalent, in occlusion and the jaws in approximate centric relation, the distance between the adhesive triangles should again be checked with the previously adjusted calipers. This distance should now be about 3 mm. less than the caliper setting, which should remain undisturbed (Fig. 2). The 3 mm. difference is the freeway space at the vertical dimension. If the difference between the caliper setting and the vertical dimension in occlusion is much less than 3 mm., or is absent, the bite has been opened and the occlusal appliance must be reduced in height (Fig. 3). If the difference is considerably more than 3 mm., the bite is probably closed and the vertical dimension in occlusion should be increased by building up the occlusal appliance to avoid an excessive freeway space.

The caliper setting is effective only for that visit; it cannot be used for another occasion. When the adhesive triangles are removed and replaced, the calipers must again be reset with reference to the physiologic rest position, again removing

Fig. 2 • Biterims are in correct vertical dimension. Caliper adjustment is unchanged. Note overlap of calipers on chin landmark indicating some closure from rest position to create freeway space

Fig. 3 • Biterims are too high, making closure to physiologic rest position impossible. Note improved appearance; however, this would cause discomfort and alveolar resorption

the back and headrest of the chair for this step.

Freeway space established with this procedure is clinically satisfactory because it can be rechecked repeatedly at any stage of the work without noticeable discrepancy. Biterims which allow a given freeway space will show the same interval at a later session or when checked by another operator. This testifies to the stability of the physiologic rest position as claimed by Thompson and Brodie.[1] Of course, the adhesive triangles cannot and need not be placed identically each time; it is only necessary to set the calipers at the most stable interval between them which corresponds to the physiologic rest position of the mandible.

The use of calipers is to be preferred to a millimeter rule because it eliminates reading the fine scale at one triangle while keeping the end of the rule level with the apex of the other. The everted ends of the calipers can be lined up with the registration points with very light contact, eliminating the variable factor of tissue compressibility and movement which is present with other instruments and technics. The adjustment of the calipers can be managed by the thumb and index finger of one hand which may be steadied, if desired, against the patient's cheek. The 3 mm. overlap, which represents the average freeway space when the teeth are in occlusion, is an interval which every dentist can gage by eye with sufficient accuracy.

Of course the individual patient may require a freeway space that does not conform to the average of 3 mm. For example, it sometimes occurred that patients had so little room for denture baseplates between retromolar pads and maxillary tuberosities that the bite had to be opened slightly, thus diminishing the freeway space to about 1.5 mm. Conversely, in a case with severely resorbed ridges and a large intermaxillary distance in the physiologic rest position, it was necessary to close the bite somewhat, reducing the distance between occlusal plane and ridge crests in order to reduce adverse leverage and increase denture stability in chewing; this necessarily increased the freeway space to perhaps 6 mm. Little or no effect was observed upon the esthetics of the case, other factors being equal, because the normal patient does not keep his dentures in occlusion when at rest and only momentarily when chewing. Such arbitrary reduction in vertical dimension, with attendant increase in freeway space, must be avoided where there is evidence of temporomandibular joint disorder.

SUMMARY

The physiologic rest position provides a stable reference to correct vertical dimension in occlusion.[1] Identification of the physiologic rest position is a matter of finding the most stable intermaxillary distance between convenient landmarks when the patient is induced to relax without support of back or headrest.

The freeway space is the difference between two vertical dimensions: (1) the physiologic rest position, in which the

freeway space is visible and (2) the intermaxillary distance with the teeth, or equivalent, in occlusion.

Use of artificial landmarks on the nose and chin, in the form of triangles of adhesive tape, simplifies the procedure and eliminates the need for roentgenographic records and repeated exposures to register bony landmarks.

154 West Seventy-first Street

Partial denture prosthesis: a preventive oral health service

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Partial denture prosthesis which was practiced by the Etruscans 2,500 years ago is, perhaps, the oldest form of prosthetic dentistry. However, the elevation of partial denture prosthesis from empiricism and quackery to a rational and professional mode of dental treatment has not been easy. It has been attended by alternate advance and retreat, by blind pursuit of popular methods, by difficulties and disappointments with faulty materials, by slavish dependence on commercially designed and fabricated partial dentures, and by an all too prevalent belief that such service is only a temporizing measure pending the loss of the remaining teeth.

CONCEPTS OF PARTIAL DENTURE PROSTHESIS

The ideal professional concept demands a high-grade oral health service consisting of rational treatments that will satisfy the dental needs of the public. In addition to this exalted and ethical concept of dental service, there are other and less altruistic concepts dominating the practice of partial denture prosthesis today. Two of these have been handed down from the past, but, unlike the professional concept, they retain the earmarks of the mechanic and the tradesman. They are the space-filling concept and the commercial concept of partial denture prosthesis.

Space-filling Concept • The space-filling concept derives from the time when practitioners looked no farther than the edentulous space in rendering dental treatment. Dental substitutes, consisting of extracted teeth, bone, ivory, or hard wood, were fastened by wire or ligature to the remaining teeth regardless of the effect they might have on the patient's health. Today, partial dentures are regarded as space-filling appliances by some dentists who disregard the intimate relation between dental treatment and oral and systemic health.

Commercial Concept • The commercial concept may be traced to the time when many dentists, untrained and unskilled in the related crafts, were compelled to employ the goldsmith and the ivory turner

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Dean, New York University College of Dentistry.

to assist in the making of artificial dentures. Such an arrangement had a commercial aspect that has become increasingly appealing to many dentists who have delegated an increasing proportion of extraoral dental procedures to technicians through the modern commercial dental laboratories. In this manner, they have been able to increase their income and to shorten their working hours. Frequently such a setup leads to a highly commercialized practice of dentistry in which both the dentist and his patients are at the mercy of the dental laboratory. This commercial concept is steadily undermining the profession and promises to become the crux in determining the future status of dental practice. This trend will be discussed later.

OBJECTIVES IN PARTIAL DENTURE PROSTHESIS

A high-grade oral health service transcends the actual making of a substitute for the missing teeth. It is concerned with (1) the restoration of esthetics, phonetics, mastication and comfort, with (2) the preservation of tooth alignment and occlusion, as well as oral and systemic health, and (3) with the prevention of oral deformities, facial disfigurement and disturbing habits.

Restoration, the immediate objective, has been, too frequently, the only objective in partial denture prosthesis. A partial denture may be useful and yet it may be a failure from the standpoint of an oral health service. Appearance, speech and comfortable use are not the only requirements. In spite of these functional necessities the denture may cause the premature loss of the remaining natural teeth, induce oral or systemic disease, and destroy the denture-bearing tissues which might have been conserved for the support of complete dentures.

Preservation involves a long range view of partial denture service. In addition to the usual examination of the mouth, those changes in occlusion must be anticipated which may occur after the denture has been made. Preservation depends to a great extent on balanced occlusion, not only of the partial denture, but also of the remaining natural teeth. Unfortunately, the loss of a few natural teeth may result in malalignment and malocclusion of the remaining teeth. Consequently, the occlusion of the remaining teeth may have to be equilibrated which may involve the making of crowns, or the extraction of interfering teeth in order to restore occlusal balance and the proper distribution of masticatory forces.

From the viewpoint of preservation, a partial denture is not the end; it is only the means, or the method of treatment by which oral function and health may be restored and maintained. For example, much physical and mental suffering, together with tissue destruction, may be caused by an underextended lower lingual bar denture which has settled out of occlusion. When such a partial lower denture in combination with a complete upper denture is worn, traumatic occlusion caused by the natural lower anterior teeth against the upper denture may cause pain or a burning sensation in the palate or the upper anterior ridge may be literally hammered to a pulp before the malocclusion is corrected. Such dentures can scarcely be regarded as a high-grade oral health service.

Another example will show what happens when preservation is ignored. Occasionally, the dentist will be induced to make a partial denture for a patient whose remaining teeth are loose or diseased. Such dentures are usually worn until the natural teeth become so loose that they are ready to fall out. Finally the day of reckoning comes when the dentist discovers that the alveolar ridge has been destroyed and that the patient is dentally handicapped for the remainder of his life.

The old adage, an ounce of prevention

is worth a pound of cure, is especially applicable to partial denture service. Too many dentists allow their patients to expect that complete dentures will cure all of their dental troubles, even though all former dental treatment has failed. Many edentulous patients who have continuous trouble with complete dentures blame their trouble on partial dentures that were improperly made and rarely serviced by the dentist, or on the unrestored loss of some of the natural teeth. Dentists should be slow to extract remaining teeth unless they are reasonably certain that the patient's oral, systemic or mental health will be improved.

Functional disorders of the teeth may affect other parts of the body. Pain in the temporomandibular joint and muscles of mastication, disturbances of the ear, digestive disorders, and mental distress bordering on insanity, are but a few of the results of dental dysfunction. In this light, the role of partial dentures becomes increasingly important as a preventive treatment in dentistry. A too narrow view of prevention and the failure to regard prosthesis as a preventive practice in dentistry have resulted in widespread disregard of the biologic foundation upon which all comfort and health promoting partial dentures depend.

BIOMECHANICAL CONSIDERATIONS IN PREVENTION

The biomechanical sciences are indispensable to a high-grade partial denture service, since they make possible the solution of perplexing problems which are common to dental restorations. Among these, the problems of support, design and environment will be discussed.

Support in partial denture prosthesis is the ability of the denture to resist the stress that is applied to it during function. It differs from retention, which tends to retain the denture in position against the displacing effect of gravity, the tongue, or the tendency to momentary tilting during biting of foods. The resistance required for support must be computed in terms of the total pressure applied during mastication, including leverage when present. The ability of a tooth to resist stress is much greater than that of the mucous membrane. Further, the stress-resisting ability of each tooth varies according to its location in the arch, its osseous support and its state of health. Likewise the mucous membrane varies in its ability to resist stress. Normal mucosa covering well formed ridges resists stress more effectively than flabby mucosa which covers greatly resorbed alveolar ridges. Unfortunately, the stress-resisting properties of oral tissues are not as well known as are those of materials used in the industries. If dentists could refer to a manual containing the predetermined stress-resisting properties of oral tissues, as does the engineer when he plans the use of materials in a building, the problems of partial denture prosthesis would be greatly simplified.

This problem is further complicated when a denture requires a combination of tooth and mucosa support—for example, a lower lingual bar denture which is to replace the posterior teeth only. Since a normal tooth can resist more stress than the mucous membrane, it is bad practice to support one end of a lower partial denture by the natural teeth while the other end is supported by the mucosa. Such a denture requires frequent relining and soon sinks out of occlusion, thereby shifting the stress of mastication together with leverage onto the natural teeth.

The stress resistance of a tooth has been compared with that of the mucosa by comparing the total root surface area which supports a tooth in its socket and the surface area of the mucosa which covers the socket after the same tooth has been extracted. This was done by covering the roots of extracted teeth with cellulose which later was peeled off and measured to determine the total root sur-

face area of each tooth. Likewise a cross section was made through the neck of the tooth and the total surface area of this section was measured and compared with the total root area. It was found that the total root area was from 6 to 10 times greater than the cross section area of the neck of the same tooth.

In the designing of partial dentures, tooth-mucosa supported or wholly mucosa-supported, the area of the denture base should be larger than the total root area of the extracted teeth; that is, more than six times the surface area of the mucosa which covers the healed sockets. The partial denture base should be larger than the total root area of the replaced teeth because sound natural teeth can withstand at least three times more biting pressure than can the mucous membrane. To provide support comparable to that of the natural teeth, the base of a mucosa-supported partial denture would have to cover a surface approximately three times the total root area, or eighteen times that of the mucosa covering the sockets. Such ideal mucosa support is not possible because the denture bearing surface of the jaw is not large enough. For example, when a lower lingual bar denture is to be made, it is advisable to make a muscle-trimmed partial impression similar to a complete lower impression so that the saddles may be extended to the very limits of the denture-supporting tissues. By this means the posterior saddles are provided with all available, though insufficient, mucosa support.

The quality of the available partial denture support is an important factor in deciding whether a partial or a complete denture is indicated. When the saddles of a partial denture borne by tooth and mucosa cannot be properly supported, the stress of mastication is applied to the remaining natural teeth. This may result in the destruction of the occluding natural teeth and their supporting tissues in one or in both jaws. Likewise it may cause rapid resorption of the ridge of the opposing jaw if a complete denture is worn. In order to avoid these destructive changes, it is frequently advisable to remove the remaining teeth, conserve the ridge, and make a complete denture in which the occlusion may be balanced.

While environment plays an important part in the growth and development of all life, its importance in maintaining the health of tissues under a partial denture is often neglected. A partial denture changes the environment under which the oral tissues must function. When it is tooth-borne, the denture increases the work which an abutment must do. When it is mucosa-borne, it changes the character of the work which the mucosa must perform. Normally the work of the mucous membrane is confined primarily to protection. When it is covered by a denture, however, it must function as a supporting tissue for which it is not primarily intended. Masticatory force, formerly resisted by the natural teeth, is now directed against the mucous membrane causing displacement or compression between denture and underlying bone. This interferes with normal nutrition, traumatizes the mucosa, and results in an increase of connective tissue fibers and consequent loss of denture stability.

The changed role of the mucous membrane from a protective to a denture-supporting tissue requires careful designing and constructing of the partial denture to provide long and satisfactory service. First, the occlusal area of the posterior teeth on the denture should be reduced so as to avoid concentration of large masses of food between the opposing teeth. Second, the cutting surfaces of the teeth must be effective so as to penetrate the food with the minimum amount of pressure. Third, the size of the denture base should be increased to the maximum to reduce the pressure per unit of surface area covered. Fourth, the base must be stabilized to avoid tilting and leverage. Fifth, the denture should be removed at night to allow the mucosa to return to

normal, and, sixth, an occasional meal should be eaten without the denture so as to maintain oral health by subjecting the tissue to the stimulating brushing action of foods. By observing these and other precautions the quality of the service may be increased and the denture-supporting tissues may be maintained.

The teeth and their supporting tissues are infinitely more valuable and more important than the clasps and the denture base, yet more attention is directed toward the strength of the materials and tightness of the fit and less toward the tolerance and health of the oral tissues which must support them. When denture materials are evaluated in terms of their contribution to preservation and prevention, it is found that clasps should be made of such material and in such a manner as to permit the tooth to continue, under most favorable environment, its normal functions and movements. This consideration calls for clasp metal which is sufficiently flexible to permit normal tooth movement. There is no merit in having tightly fitting clasps which tend to extract the teeth each time the denture is removed. A properly made denture is light in weight and requires little retention to keep it in place. It must also be available to the patient at a reasonable fee and be capable of adjustment, relining, and repair in order to meet the exigencies of denture service and to permit its adaptation to the biologic changes which may occur in the patient's mouth.

Partial dentures should be constructed with regard for the health of each remaining tooth including its surrounding gingival epithelium as well as its peridontium and alveolus. The mucous membrane which supports the saddles, connectors and base must not be loaded beyond the point of physiologic tolerance. Each partial denture must be designed so as to utilize the most favorable support of the remaining teeth and where adequate tooth support is lacking to utilize fully the support afforded by the mucous membrane.

Enough has been said to show that prevention is one of the chief objectives in partial denture service; also, that the making of a partial denture is dictated by the biologic requirements of each mouth. This view of partial denture prosthesis as a preventive oral health service makes it imperative that every procedure in the making of the partial denture shall be under the control of the dentist. Design, support and occlusion are interrelated biomechanical requirements, which no responsible dentist can delegate to the technician unless detailed instructions are given to guide him in his work.

Most of the partial dentures available to the public today are the result of assembly line production. Their design and manufacture are controlled by industrial dental laboratories who employ materials and methods not readily available to the dentist. Generally, the dentist supplies the impression, the jaw relation record, and the desired hue of the teeth; the remainder is delegated to the laboratory. It is to be expected that steel-alloy appliances of this type cannot meet the oral health needs of the average patient, just as they may not be compatible with his ability to pay. The vise-like grip of rigid steel clasps envelops the dental arch so that masticatory force may destroy the periodontal tissues which nature intended to function as separate units.

Today there are subversive influences both within and without the dental profession which tend to degrade the quality of partial denture service to the public. Within the profession, there are dentists who have virtually surrendered their professional prerogatives by delegating all partial denture procedures, except the making of an impression and the collection of the fee, to the commercial dental laboratories. Without, there are interests that have made it progressively easier for the dentist to become dependent on technicians. They have enticed and induced

the dentist to give up the so-called drudgery of the laboratory work. Some technicians have appropriated the dentist's right to design the denture and to specify the kind of material of which it shall be made. They have developed and promoted materials and methods impracticable for technical use by the dentist, and these have given rise to current competitive practices which the average dentist cannot ignore financially.

In the midst of widespread patronage of commercial dental laboratories, the dental profession is confronted with the problems of socialized dentistry, and licensure of dental technicians. The outcome of such trends in other countries is either unknown to, or has failed to arouse, the American dental profession. When dental technicians in other countries began encroachment on the dental profession, they did not presume to do dental work involving the natural teeth. They confined their practice to complete dentures. Later, they began to make partial dentures which frequently required grinding, filling, or crowning of the natural teeth. After that infringement was upheld by the courts, other fields of dentistry were invaded until technicians had appropriated every right formerly belonging to the dentists. In addition, schools for technicians were established and soon the number of practicing technicians exceeded the number of practicing dentists.

Today in America the same trend is in its initial stage. The illicit making of complete dentures by dental technicians is increasing in many large cities. The dental profession can no longer maintain a complacent attitude toward the illegal making of complete dentures by technicians. Amid social changes it is not improbable that such forms of low-grade dentistry might receive political sanction, unless dentists are intent on defending their rights and in guarding the oral health of the public. Should a change in present dental laws permit technicians to make complete dentures for the public, it would be but a short time afterward until partial dentures would also be made by technicians. Once the right to make partial dentures for the public has been granted to technicians, the last line of defense will have been invaded and technicians will then be permitted to practice all phases of dentistry.

Partial denture prosthesis is dentistry's last line of defense. If the dental profession regards and practices it as a space-filling mechanical procedure, the time will come when dental laboratories will make partial dentures, including the impression, and serve the public directly. If instead, the dental profession regards and practices partial denture prosthesis as a preventive oral health service, it will continue to be an inalienable and increasingly health-promoting part of the practice of dentistry.

Great Men • Great men and insignificant men have like accidents, like vexations and like passions; but the former are on the outside of the wheel and the latter near the center, and therefore less agitated by the same movements. *Pascal.*

A study of partial denture clasping

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The most controversial and seemingly contradictory phase of partial denture design is that of the clasp component. Many clasp types have been presented to the profession, each being claimed by its originator to be the solution of all clasping problems and difficulties. A study of the rationale and method of design of each clasp type reveals a startling disagreement. One might easily conclude that there is an irreconcilable and unscientific basis for the design of partial denture clasps.

However, by analyzing all available clasp types from an unprejudiced point of view, and eliminating all preconceived conclusions, a common basis for clasp design can be found. Basic fundamentals applying to all clasps may be formulated and any specific clasp type may be rated on its ability to carry out these concepts.

To illustrate the fundamentals of clasp design, the circumferential clasp will be used as an example. It is the type of clasp most frequently encountered in partial denture construction, and is the basis for all types of clasp design.

NOMENCLATURE

A circumferential clasp is one that envelops a major portion of the tooth circumference and rests on tooth structure in its entirety. It is to be distinguished from the bar clasp originated and popularized by F. E. Roach.[1]

A bar clasp contacts only a minor portion of the tooth circumference and the points of contact are connected to the partial denture by means of bars that rest on the gingival tissues.

The typical circumferential clasp, regardless of its material of construction, its cross sectional diameter, and its cross sectional outline, may be divided into two parts, a body and an arm (Fig. 1). The body is that segment of the clasp which contacts the proximal surface nearest to the prosthesis. The arm is that segment of the clasp which contacts the buccal or lingual surface.

The body of the clasp, because of its connection to the usual rest and upright, is rigid. The arm of the clasp, if properly tapered and of a 12 to 16 gage construction, may arbitrarily be divided into three functional sections. The basis of this division is the relative rigidity and flexibility of each of the three sections. The third of the clasp arm that joins the body still retains most of its rigidity and may be called the rigid third. Because of the length of a clasp arm, the terminal third has the property of flexibility and may be called the flexible third. The segment lying between these two has an intermediate degree of resiliency and may be called the semirigid third.

In determining the correct positioning

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1. Roach, F. E. Mouth survey and design of partial dentures. J.A.D.A. 21:1166 (July) 1934.

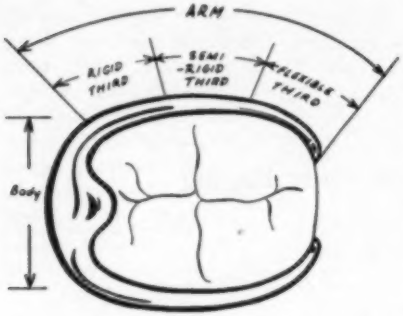

Fig. 1 • Parts of the typical circumferential clasp

of these clasp sections on an abutment tooth, it is necessary to segregate the basic contours that are found on natural teeth. Such a contour analysis has been presented by F. C. Elliott.[2] If a tooth is held in a vertical position and a marking device, parallel to the long axis of the tooth, is carried around its circumference, the marker will circumscribe a line or zone of maximum contour (Fig. 2). Dr. Elliott has named this contour the neutral zone. All tooth surfaces occlusal or incisal to the neutral zone are of lesser contour and converge to a point somewhere above the occlusal or incisal surface. This zone is called the occlusal or incisal convergence zone. In this zone lie the nonundercut areas of the tooth and it is commonly referred to as the nonundercut part of the tooth. Conversely, all tooth surface gingival to the neutral zone have lesser contour and converge to a point somewhere gingival to the crown of the tooth. In this zone lie the undercuts of the tooth and it is usually referred to as the undercut part of the tooth. The application of this terminology will facilitate the study of clasp functions.

CLASP FUNCTIONS

In partial dentures constructed with shallow rests, two basic functions are performed by clasps. The first function, as the name implies, is that of the primary retention of the prosthesis. Because of muscle action during speech, mastication and deglutition, the action of sticky foods, and the factor of gravity, a partial denture will be subjected to vertical dislodging forces. To construct a satisfactory prosthesis, it is necessary to counteract and neutralize these vertical forces. The successful attainment of this objective will provide a partial denture with primary retention.

In addition to primary retention, clasps must perform a second function, the transmission of lateral forces from a partial denture to abutment teeth. During mastication, a partial denture will be subjected to lateral forces. To provide the prosthesis with stability, efficiency and mouth comfort, it is necessary

2. Elliott, F. C. A method that simplifies the design of partial dentures. J.A.D.A. 27:1263 (Aug.) 1940.

Fig. 2 • Segregation of basic tooth contours

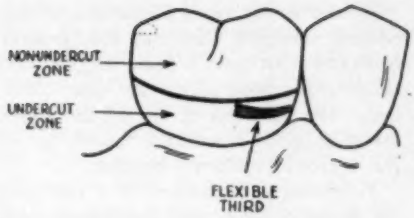

Fig. 3 • Attainment of primary retention. The flexible third of a clasp arm is passively placed in the undercut zone of the tooth

to transmit these forces to remaining mouth structures.

The mouth structures that are available are the edentulous areas and the remaining natural teeth. However, these structures cannot accept lateral forces to an unlimited degree. They have a definite physiologic tolerance point and only lateral stresses falling short of it can be favorably accepted. Lateral stresses exceeding the physiologic tolerance point of supporting structures cause an overload and interfere with proper function.

By proper design, lateral forces should be distributed to all remaining supporting structures so that the physiologic tolerance points of these structures are not exceeded. In this manner, both the remaining natural teeth and the edentulous areas may be utilized as supports for a partial denture. Clasps perform this function of transmission of lateral forces to abutment teeth.

PRIMARY RETENTION

A clasp will provide primary retention when it can successfully counteract vertical dislodging forces. To resist these vertical forces, a tripping action is necessary. A highly effective tripping action may be attained if a simple concept of primary retention is followed. It is the passive placement of the flexible third of a clasp arm in the gingival convergence (undercut) zone of the tooth (Fig. 3). This passive placement of the flexible third of a clasp arm in an undercut area will result in a tripping action when the partial denture is subjected to vertical displacing forces. When these vertical displacement forces are nonactive, a tooth clasped in this manner will not be subjected to any tension or strain and a state of complete equilibrium will result.

An alternate method of effecting primary retention is the application of spring tension against a parallel sided or undercut tooth surface with a flexible third of a clasp arm. Although good primary retention may be accomplished by this method, its use is dangerous. The presence of unequal tension in opposite clasp arms and the positioning of such arms on different vertical levels of the tooth may cause tooth movement or alveolar destruction.

By methods to be discussed subsequently, the adverse effects resulting from the placement of clasp arms on different

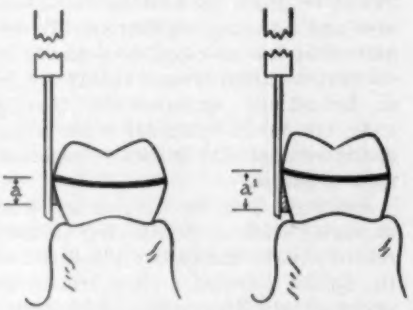

Fig. 4 • Determination of the vertical distance a flexible third of a clasp arm is to be placed in an undercut area. Left: When the tooth surface has a pronounced curvature the desired amount of horizontal undercut (distance between marker and tooth surface) can be effected by placing the flexible third only a short distance (a) below the neutral zone. Right: When the tooth surface has a slight curvature, the same horizontal undercut engagement can only be effected by placing the flexible third a greater distance (a^1) below the neutral zone

vertical levels may be counteracted. However, the problem of unequal arm tension is not so readily solved. It is a rarity or an impossibility to equalize spring tension in clasp arms and thereby attain intraclasp arm equilibrium. On the other hand when the principle of passive placement is utilized, intraclasp arm equilibrium is automatically attained.

If by some unique method, intraclasp arm equilibrium is realized, the problem of interclasp equilibrium must then be considered. How may the tension in the various clasps used on a partial denture be governed or controlled? There is no satisfactory method of doing so. As a result, differences in clasp tension are present among the clasps of a partial denture using the spring tension principle of primary retention. In direct contrast, these differences in clasp tension are completely absent when passive placement of flexible thirds in undercut areas is the principle of retention used. Differences in tension on the various abutments may have detrimental effects. For the preservation of abutments, every attempt should be made to establish intraclasp arm and interclasp equilibrium. To repeat what has so often been stated in the past, a partial denture should not be an orthodontic appliance for moving teeth, but should be similar to an orthodontic retainer that is used to maintain tooth positions.

Seemingly then, the simplest and least damaging method of attaining primary retention is by the passive placement of the flexible third of a clasp arm in an undercut area. In so doing an important question immediately poses itself. What is the correct distance to place this flexible third in the gingival convergence zone? The amount of horizontal undercut (distance between marking device and tooth surface in Figure 4) that the flexible third of a clasp arm may engage is determined by its resiliency. Factors controlling this resiliency are the type of metal used and the clasp arm dimensions.

Insofar as the types of metal are concerned, wrought wire has the greatest resiliency, cast gold a lesser degree and cobalt-chromium alloy the least resiliency. The selection of one of the above materials gives a working knowledge of the degree of resiliency possible.

Following the selection of a material, the factor of clasp arm dimensions must be considered. Clasp arm resiliency bears a direct relation to its length and an inverse relation to its cross sectional diameter (gage).[3] A constant of this variable factor may be established by decreasing the gage of shorter clasp arms or increasing the gage of longer clasp arms. This permits the attainment of a constant resiliency of the flexible third of the clasp arm. Knowing the type of metal employed, and keeping the resiliency of the terminal third at a constant, the horizontal distance of undercut engagement can be safely determined.

To effect this desired horizontal undercut engagement, the flexible third of a clasp arm must be placed at an appropriate distance below the neutral zone of the tooth. The factor determining the value of this distance is the curvature of the tooth surface in the gingival convergence zone (Fig. 4). When the tooth surface curvature in the gingival convergence zone is pronounced, the predetermined horizontal undercut engagement will be achieved by placing the flexible third only a short distance below the neutral zone (Fig. 4, distance a). When the curvature is slight, the same horizontal undercut engagement can only be achieved by placing the flexible third a greater distance below the neutral zone (Fig. 4, distance a^1).

TRANSMISSION OF LATERAL FORCES

The second function of a clasp is to transmit the lateral forces from a partial

3. Gillett, Henry W. Clasps and stabilizers for partial dentures. New York J. Den. 8:17 (Jan.) 1938.

denture prosthesis to an abutment tooth. This lateral force transmission accomplishes two objectives. The first and most obvious is the limiting of the lateral movement of the partial denture. The second and perhaps more important is the prevention of an overloading of the edentulous areas. By the transmission of some of these forces to abutment teeth, a lesser amount of lateral stress will be placed on the ridges, thereby minimizing alveolar resorption.[4]

To accomplish lateral force transmission, the physical property of rigidity is necessary. The rigid third of the clasp arm performs this function. Lateral force transmission will be satisfactorily attained if the principle of placing the rigid third of the clasp arm in the occlusal convergence (nonundercut) zone is followed (Fig. 5, left). The necessity of utilizing this nonundercut zone of the tooth is evident, since a rigid part of a partial denture cannot be seated in an undercut area unless grinding is resorted to resulting in a loss of contact.

To complete the design of the typical clasp arm it is now necessary to join the isolated rigid and flexible thirds. This is accomplished by the final third of the clasp arm; namely, the semirigid third (Fig. 5, right). The semirigid third accomplishes a gradual transition from the opposite properties of rigidity to flexibility in a clasp arm. The relation of the semirigid third to the basic tooth zones is a gradual passage from the nonundercut zone through the neutral zone and finally a blending into the flexible third of the clasp arm lying in the undercut zone.

A question might arise as to whether it is always desirable to use a rigid third of a clasp arm to transmit lateral forces to an abutment tooth. If the factors of root length, bone support and occlusal relationship are favorable, lateral force transmission by means of a rigid third will not be questioned. However, if these factors are unfavorable, might not this transmission of lateral forces cause an overload with subsequent periodontal destruction? To reduce these lateral forces might it not be wiser to use clasp arms that are flexible in their entirety? Logical analysis will not permit the acceptance of this procedure. Completely flexible clasp arms are undesirable because (1) they permit excessive lateral movement of the partial denture; (2) they place excessive stresses on the edentulous area, and (3) their alternating opening and closing during the application of lateral forces will subject abutment teeth to a damaging side to side movement.

When the strategic factors of root length, bone support and occlusal relation of an abutment tooth are unfavorable, resorting to auxiliary measures will prevent periodontal damage by lateral force transmission through the rigid third of a clasp arm. These auxiliary measures are multiple clasping, fixed splints and stress-breakers.

If an abutment tooth is judged incapable of favorably accepting lateral forces through a single clasp, two or more clasps, or even full mouth clasping should be substituted. As many clasps should be used as are necessary to reach a point where each tooth is no longer subjected to a lateral force in excess of its physiologic tolerance.

In partial dentures with free extension saddles, the settling of the appliance may cause a disturbance of a multiple clasping arrangement. If a rebasing procedure is immediately instituted, the relation of clasps to teeth can be properly reestablished. However, if through patient or dentist negligence the saddles are not rebased, the clasps will then fail to function as originally planned and the terminal abutment teeth may be seriously traumatized.

To prevent this unwanted sequence of events, where a multiple clasping ar-

4. Schuyler, Clyde H. Stress distribution as the prime requisite to the success of a partial denture. J.A.D.A. 20:2148 (Dec.) 1933.

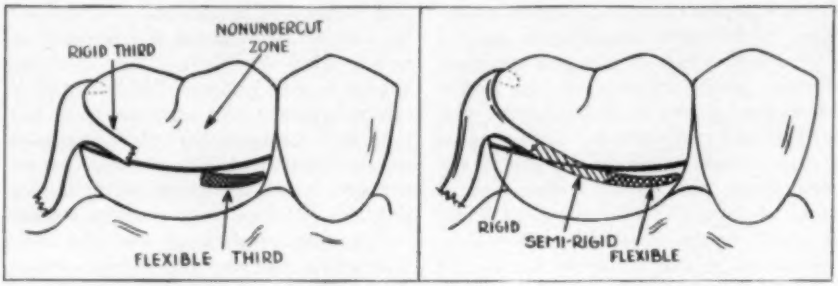

Fig. 5 • Left: Attainment of lateral force transmission. The rigid third is placed in the nonundercut zone of the tooth. Right: Placement of the semirigid third completing the clasp arm

rangement will not remain static, it is preferable to use fixed splints. The use of fixed splints distributes lateral forces to a number of teeth rather than to an individual tooth. These fixed splints are simply crowns or three-quarter crowns soldered together. A sufficient number of teeth are included in the splint so that the ultimate amount of lateral force to which each tooth is subjected is well within its physiologic tolerance. When a fixed splint is used, only one clasp on the terminal abutment of the splint is necessary.

When an unfavorable abutment tooth stands isolated in the arch, any opportunity for multiple clasping or fixed splinting is eliminated and a possibility of overloading the tooth exists. In this situation, to control the lateral forces ultimately transmitted to the tooth, the judicious use of a properly designed stress-breaker is indicated.[5, 6] A stress-breaker reduces the magnitude of lateral forces transmitted to the tooth and increases the amount placed on the edentulous areas.

RECIPROCATION

When a clasp arm places the forces of retention and lateral force transmission on a tooth surface, means must be provided to counteract and balance them. The balancing of these forces is necessary to prevent tooth movement or tooth tipping. This balance and counteraction is known as reciprocation.

To attain reciprocation on a horizontal plane it is necessary to have a minimum of three points of contact encircling more than 180 degrees or half of the tooth circumference (Fig. 6). Failure to do so will permit the tooth to move away from the clasp arm when forces are applied to it by means of that arm. Figure 6, A illustrates probable tooth movement re-

5. Neurohr, Ferdinand G. Spring lock and insertion pin lock attachments in saddle designs for partial dentures. J.A.D.A. 23:1530 (Aug.) 1936.

6. Van Minden, F. Ideal stressbreaking for partial dentures. J.A.D.A. 30:657 (May) 1943.

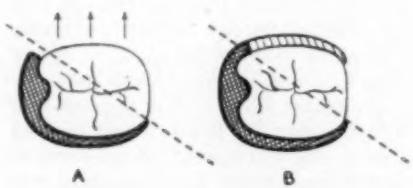

Fig. 6 • Horizontal reciprocation. A: Clasp body and arm fail to encircle tooth more than 180°. Arrows indicate probable direction of tooth movement. B: Minimum encirclement (crosshatched shading), and suggested additional encirclement (single line shading) for effective horizontal reciprocation

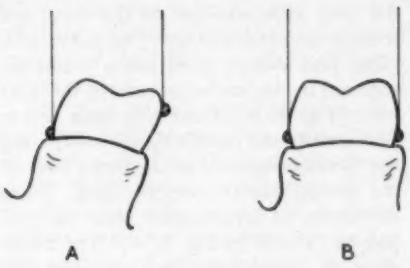

Fig. 7 • Vertical reciprocation. A: The different vertical levels of the clasp arms may result in tooth tipping. B: The same vertical level of clasp arms (as close to gingiva as possible) eliminates the possibility of tooth tipping

sulting from lack of horizontal reciprocation.

To attain reciprocation on a vertical plane, it is necessary to have both clasp arms on the same level and the level should be as close to the gingival margin of the tooth as possible. This is advisable to avoid possible tipping of the tooth and to reduce the vertical lever arm over which lateral forces are acting. Reduction of the lever arm will result in a lower moment of force being transmitted to the periodontium of the abutment tooth. Figure 7 illustrates correct clasp positioning for vertical reciprocation.

If tooth contours dictate the placement of clasp arms on unequal levels, means must be instituted to correct this unfavorable condition. Correction may be accomplished by:

1. Changing the path of insertion of the partial denture to get a more favorable survey line (neutral zone).
2. Grinding of unfavorable tooth contours.
3. Recontouring tooth forms with a restoration if excessive grinding is necessary.
4. Using of a deep rest in an inlay in place of the usual shallow rest.

The use of these corrective measures will effectively counteract any tendency to tooth movement or tooth tipping.

Other requisites of a successful clasp on which there is universal agreement are proper taper and minimum tooth coverage. Clasps must be tapered both in width and cross sectional diameter to provide maximum strength and flexibility. Regardless of the type of clasp construction, only the minimum amount of tooth coverage commensurate with correct function should be used.

ATYPICAL CIRCUMFERENTIAL CLASPS

When abutment teeth are properly formed and stand in a correct vertical alignment, the fulfillment of the preceding concepts is a relatively routine procedure. Frequently, however, because of tooth tipping, tooth rotation, and lack of natural tooth contour, there is a variation in the normal undercut and non-

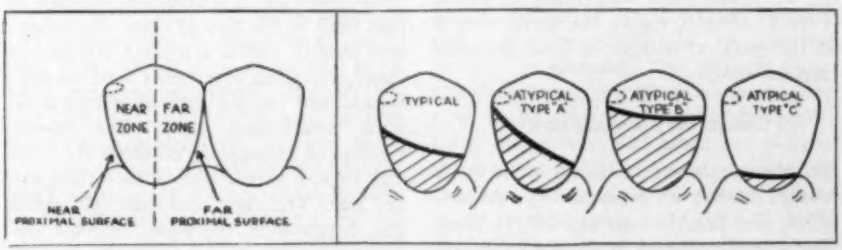

Fig. 8 • Left: Division and nomenclature of tooth surfaces. Right: Typical and atypical types of survey lines

undercut zones. These variations do not permit the use of the typical circumferential clasp and appropriate atypical variations must be adopted if the basic principles of clasping are to be incorporated in the final design.

If a marking device is carried around the circumference of these teeth having atypical contour or position, three main variations in the relation of the neutral, occlusal convergence and gingival convergence zones will be encountered. For the purpose of describing these variations, the buccal or lingual surface of a tooth may be arbitrarily bisected in a vertical direction (Fig. 8, left). That half nearest the edentulous area may be called the near zone, and that half away from the edentulous area may be called the far zone.

In the typical tooth (Fig. 8, right) the neutral zone or survey line lies in the middle of the near zone of the tooth surface, and at the junction of the middle and gingival thirds in the far zone.

In the first atypical variation, which may be called Type A (Fig. 8, right), the survey line is in the occlusal third of the tooth at the beginning of the near zone, rapidly approaches the gingival margin at the junction of the far and near zones, and is on the gingival margin in the greater part of the far zone on the tooth surface. In the second variation, which may be called Type B (Fig. 8, right), the survey line is in the occlusal third of both the near and far zones. In the third variation, which may be called Type C (Fig. 8, right) the survey line is at the gingival margin in both the near and far zones.

ATYPICAL TYPE A VARIATION

To effect primary retention on a tooth surface having an atypical Type A variation, the flexible segment of the clasp arm must be placed in the available undercut area. With the atypical Type A variation, the undercut area occurs in the near zone and not in the usual far zone of the tooth surface. The first step in clasp arm design is to place a flexible segment in this undercut area of the near zone (Fig. 9, A). Once this basic step is performed, the problem of connecting the flexible segment to the main part of the partial denture presents itself. Three directions of attachment may be employed (arrows in Fig. 9, A). The directions of attachment may be from the gingival, from the far zone and from the near zone. To utilize a gingival direction of attachment, a bar is placed on the gingival tissues, traversing the marginal gingiva and running occlusally until it attaches to the flexible segment (Fig. 9, B). This results in the bar clasp type of design originated by F. E. Roach.[1] The bar type of clasp and all its variations may be utilized if the gingival direction of attachment is selected.

The tripping action of a bar clasp, because of its approach to the undercut area, is far superior to that of a circumferential clasp.[7] On the other hand, because of its failure to provide a rigid contact on a nonundercut tooth surface, the bar clasp is ineffective in transmitting lateral forces to the clasped tooth. This is a highly important requisite of any clasp and the bar clasp does not perform it effectively.

A second direction of attachment that may be used is one running from the far zone to the retentive segment lying in the near zone (Fig. 9, C). The resulting clasp arm runs in a direction opposite to that used in the typical clasp arm design and may be called a reverse attachment clasp arm. This arm when used on both buccal and lingual surfaces forms a reverse attachment clasp. The reverse method of attachment converts the atypical Type A survey line to the typical survey line. The rigid and semirigid thirds are designed in the same manner em-

7. Stone, Eugene R. Tripping action of bar clasps. J.A.D.A. 23:596 (April) 1936.

ployed for the typical clasp and are therefore equally effective in performing the desired clasp function of lateral force transmission.

The third possible direction of attaching this flexible retentive segment to the main appliance is from the near zone of the tooth surface being clasped. A routine connecting section is designed running from the near zone to the far zone and then looping back on itself to join the flexible segment (Fig. 9, D). This may be called a reverse loop clasp arm. When used both on buccal and lingual surfaces these arms form a reverse loop clasp. In using these arms on both surfaces, care must be exercised to provide satisfactory reciprocation and thereby avoid tooth movement away from the retentive segments of the arms.

These three possibilities will handle any clasping problem that arises on a tooth having an atypical Type A survey line.

ATYPICAL TYPE B VARIATION

The atypical Type B survey line is one that lies in the occlusal third of the tooth being clasped. To properly design a clasp arm on such a surface, two factors must be considered. They are (1) esthetics and (2) supporting structure of the tooth being clasped.

If the alveolar support of the tooth is favorable and esthetics is an unimportant factor, the typical circumferential clasp may be designed on an atypical Type B survey line. The rigid, semirigid and flexible thirds can easily be placed in their proper relation to the various tooth zones previously considered (Fig. 10, A).

A clasp so designed will provide adequate primary retention. However, there is a disadvantage in its method of lateral force transmission. Lateral forces applied to the tooth through the rigid third will act over too great a lever arm. The final forces to which the supporting structures are subjected may be dangerously close to or exceed their physiologic tolerance.

If the alveolar support of the tooth under consideration is favorable, and the factor of esthetics is strategic, the above clasp arm design is unacceptable on the labial or buccal surface. To satisfy esthetic requirements, the semirigid and flexible thirds may be eliminated, on the buccal or labial surface only, leaving the rigid third to transmit lateral forces (Fig. 10, B). When this is done, one must bear in mind that primary retention of the arm is lost. If this retention is necessary, it must be attained on other tooth surfaces. The lingual arm must be a full arm to provide for complete clasp function. A clasp designed in this fashion will be acceptable esthetically, will transmit lateral forces properly and provide retention on one arm only. A thin gage wrought wire clasp is often used when esthetics is important. However, its use is not completely satisfactory as it provides primary retention but fails as a lateral force transmitter.

When the atypical Type B survey line is present on a tooth having unfavorable alveolar support, every effort must be made to design a clasp that has its arms as close to the gingiva as possible. To do so the only recourse possible is to establish proper tooth contour by means of a restoration. Once this is done, a clasp may be designed with its arms on a proper vertical level (Fig. 10, C).

ATYPICAL TYPE C VARIATION

The presence of an atypical Type C survey line on a tooth poses the greatest problem in clasping. The atypical Type C survey line is one that lies on or very close to the gingival margin of the tooth. Little or no undercut areas are present on the buccal and lingual surfaces. If primary retention is to be effected, other undercut areas must be utilized. A study of tooth contours reveals the presence of undercuts on both proximal surfaces of the abutment tooth and on the distobuc-

cogingival and distolinguogingival corners of adjacent teeth. Each of these surfaces may be used for retention.

If the distobuccogingival or distolinguogingival corner of an adjacent tooth is to be used for retention, the first step in

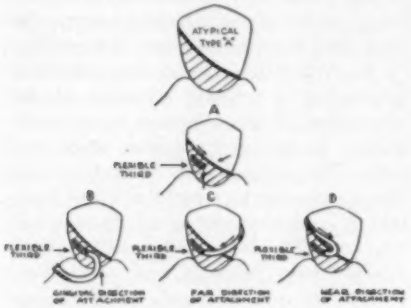

Fig. 9 • Methods of clasping a tooth surface having an atypical Type A survey line. A: Flexible segment (third) is placed in the available undercut area (near zone). Arrows indicate three possible directions of attachment of flexible segment. B: Flexible segment (third) attached from a gingival direction resulting in a bar type of clasp arm. Bar traverses tooth and gingival tissues. C: Flexible segment attached from a far direction resulting in a reverse attachment type of clasp arm. D: Flexible segment attached from a near direction resulting in a reverse loop type of clasp arm

clasp design is to place a flexible segment in this undercut. A full clasp arm is then placed on the abutment tooth. It is placed either on or occlusal to the atypical Type C survey line. The flexible third on the adjacent tooth is then joined to this arm thereby completing the design (Fig. 11). The typical circumferential clasp has thus been lengthened to engage an undercut beyond the limits of a single tooth. Hence it may be called an extension clasp. An extension clasp provides lateral force transmission by its contact of the abutment tooth and primary retention by its contact of the undercut corner of the adjacent tooth.

Occasionally the undercut in the corner of an adjacent tooth is not sufficiently defined to provide adequate retention. In such instances retention may be effected by the engagement of proximal surface undercuts. Either proximal surface of a tooth may be used to provide primary retention. The proximal surface adjacent to the edentulous area may be called the near proximal surface. The proximal surface away from the edentulous area may be called the far proximal surface (Fig. 8, left).

To effect retention on the far proximal surface, a flexible segment is placed in its undercut area (Fig. 12, A). This flexible segment may be joined to the

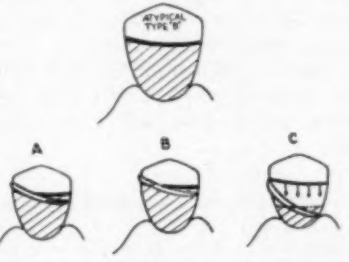

Fig. 10 • Methods of clasping a tooth surface having an atypical Type B survey line. A: Possible design if alveolar support is favorable and esthetics unimportant. B: Dotted outline indicates elimination of flexible and semirigid thirds of labial or buccal arm for esthetic reasons. A full clasp arm is retained on the lingual surace, not shown in diagram. C: Dotted line indicates typical survey line tooth presents after recontouring with a restoration

partial denture either by a near direction or gingival direction of attachment (Fig. 12, B and C). As the far proximal surface is being used for retention, a far direction of attachment is not possible.

If a near direction of attachment, arising from the near zone of the buccal or lingual surface, is desired, a full arm is placed on either the buccal (Fig. 13, B) or the lingual surface (Fig. 13, C). This arm is placed on or occlusal to the survey line and then joined to the flexible seg-

ment resting on the far proximal surface. Only a rigid third is placed on the tooth surface opposite the full arm. Its purpose is solely to provide lateral force transmission and reciprocation.

If a gingival direction of attachment is desired, a bar originating from the prosthesis is placed on the gingival tissues and joined to the flexible segment resting in the far proximal surface undercut. This bar may be placed on either the buccal (Fig. 14, B) or lingual gingival tissues (Fig. 15, B). Excellent primary retention will be provided by the resulting bar type of clasp; however, it will be ineffective in transmitting lateral

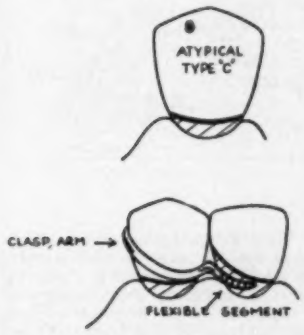

Fig. 11 • Clasp arm design on an atypical Type C survey line using the distobuccogingival or distolinguogingival corner of an adjacent tooth (extension clasp)

forces from the partial denture to the clasped tooth. To correct this shortcoming, rigid thirds[8] should be placed on both buccal and lingual surfaces to provide this necessary clasp function (Fig. 14, C and 15, C).

A far proximal surface may be engaged in any of the above fashions only if space is available. Space is provided if the contact point is open or if no adjacent tooth is present. However if neither of these conditions exist, the far proximal surface must be engaged in a different manner. When good contact is present, only the buccal and lingual extremities of the far proximal undercut may be contacted. Flexible segments starting from the buccal and lingual are placed as far interproximally as the contact point will permit (Fig. 16, A). To effect a near direction of attachment, they are joined to full arms resting on the buccal and lingual surfaces (Fig. 16, B). To effect a gingival direction of attachment, the flexible segments are joined to bars resting on the buccal and lingual gingival tissues (Fig. 17, B). In both instances, primary retention will be provided by these extensions in the far proximal surface undercut. The full buccal and lingual arms used when effecting a near direction of attachment provide effective lateral force transmission. To accomplish the same objective with a gingival direction of attachment, supplementary rigid thirds must be placed on the buccal and lingual surfaces (Fig. 17, C).

The final surface available for retention when an atypical Type C survey line occurs, is the near proximal surface. Ordinarily this surface is unavailable, as it is traversed by an upright joining the clasp and its attached rest to the partial denture base. To make the undercut of the near proximal surface available, the connecting upright must be moved to the opposite proximal surface (the far proximal). If good contact is present between the far proximal surface and an adjacent tooth, this transfer will not be possible unless space is provided. The space necessary to allow for a connecting upright and clasp body may be created by (1) reduction of marginal ridges, (2) orthodontic separation, (3) operative separation with disks, or (4) insertion of a proximoocclusal inlay with an open contact.

8. Chapelle, W. F. Clasps simplified and stabilized. D. Cosmos 73:1176 (Dec.) 1931.

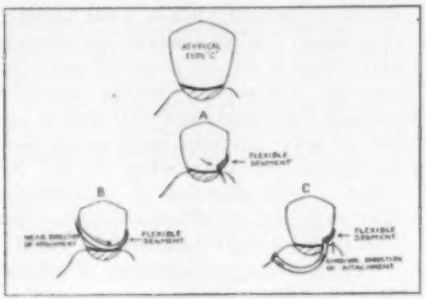

Fig. 12 • Effecting retention on an atypical Type C survey line by the use of a far proximal surface undercut. A: Flexible segment is placed in the far proximal surface undercut. Arrows indicate two possible directions of attachment. B: Flexible segment attached from a near direction. C: Flexible segment attached from a gingival direction

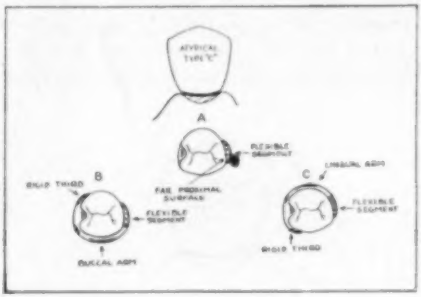

Fig. 13 • Clasp design for an atypical Type C survey line using a single flexible segment on the far proximal surface and a near direction of attachment. A: Flexible segment placed in undercut on far proximal surface. B: Near direction of attachment effected by the use of a buccal arm. Rigid third on lingual surface for lateral force transmission and reciprocation. C: Near direction of attachment effected by use of a lingual arm. Rigid third on buccal surface for lateral force transmission and reciprocation

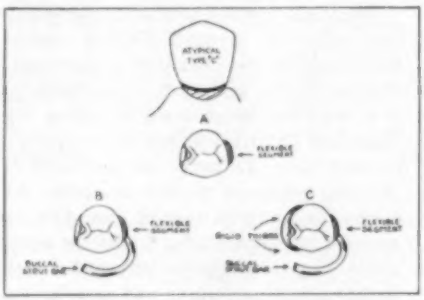

Fig. 14 • Clasp design for an atypical Type C survey line using a single flexible segment on the far proximal surface and a gingival direction of attachment. A: Flexible segment placed in undercut on far proximal surface. B: Gingival direction of attachment effected by use of a buccal strut bar. C: Rigid thirds are added both buccally and lingually to effect lateral force transmission

When the near proximal surface is thus made available, its undercut may be engaged by either a single flexible segment contacting the entire near proximal surface, or by two flexible segments originating from the buccal and lingual surfaces. When the greater degree of undercut is in the center of the near proximal surface, its contact by a single flexible segment provides superior retention. When the undercut occurs throughout the entire near proximal surface, it may be contacted by two flexible segments arising from the buccal and lingual surfaces.

If the near proximal undercut is contacted by a single flexible segment, the segment may be connected to the remainder of the partial denture by either a far direction or gingival direction of attachment (Fig. 18). A near direction of attachment is not possible as it is the

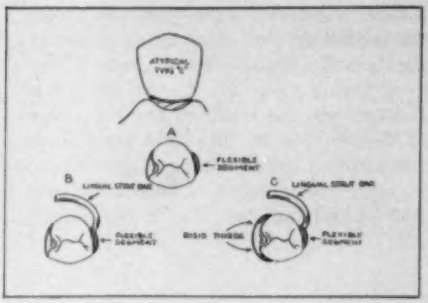

Fig. 15 • Clasp design for an atypical Type C survey line using a single flexible segment on the far proximal surface and a gingival direction of attachment. A: Flexible segment placed in undercut on far proximal surface. B: Gingival direction of attachment effected by use of a lingual strut bar. C: Rigid thirds are added both buccally and lingually to effect lateral force transmission

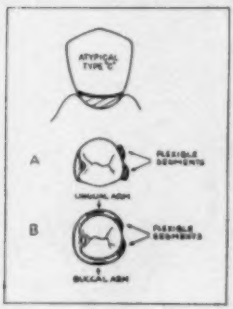

Fig. 16 • Clasp design for an atypical Type C survey line using two flexible segments on the far proximal surface and a near direction of attachment. A: Flexible segments placed in undercut on far proximal surface. B: Near direction of attachment effected by use of a buccal and a lingual arm

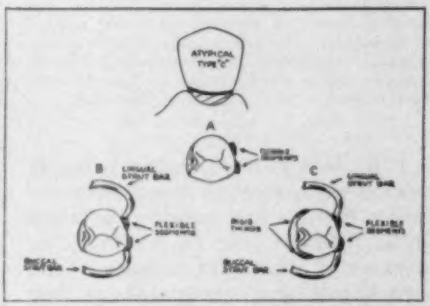

Fig. 17 • Clasp design for an atypical Type C survey line using two flexible segments on the far proximal surface and a gingival direction of attachment. A: Flexible segments placed in undercut on far proximal surface. B: Gingival direction of attachment effected by use of a buccal and a lingual strut bar. C: Rigid thirds are added both buccally and lingually to effect lateral force transmision

surface being used for retention. For a far direction of attachment, arising from the far zone of the buccal or lingual surface, the flexible segment is joined to a full clasp arm resting either on the buccal (Fig. 19, C) or lingual surface (Fig. 19, B). This arm runs in a direction opposite to that normally encountered. It is a reverse type of attachment. The tooth surface opposite the full clasp arm requires only a rigid third of a clasp arm. It is needed to provide lateral force transmission and reciprocation. Because this opposing surface lacks undercuts, clasp segments delegated to provide retention (semirigid and flexible thirds) cannot function properly if placed on it and thus are unnecessary.

For a gingival direction of attachment, the flexible segment on the near proximal

surface is joined to a bar originating from the partial denture and resting either on the buccal (Fig. 20, B) or lingual gingival tissues (Fig. 21, B). As previously pointed out, the resulting bar clasp type of design fails to provide lateral force transmission and must be supplemented by rigid thirds placed on both the buccal and lingual surfaces (Fig. 20, C and 21, C).

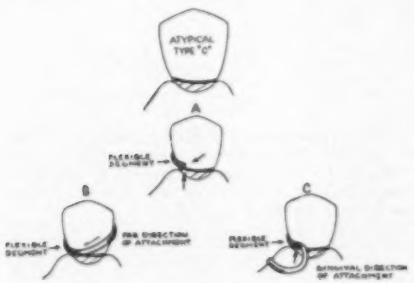

Fig. 18 • Effecting retention on an atypical Type C survey line by the use of a near proximal surface undercut. A: Flexible segment is placed in the near proximal surface undercut. Arrows indicate two possible directions of attachment. B: Flexible segment attached from a far direction. C: Flexible segment attached from a gingival direction

If the near proximal surface undercut permits engagement by two flexible segments, they are first properly positioned in the undercut (Fig. 22, A). For a far direction of attachment, complete buccal and lingual arms are placed on their respective surfaces. The arms are then connected to the flexible segments lying on the near proximal surface (Fig. 22, B). This results in a circumferential clasp with near surface proximal extensions. The clasp runs in a direction opposite to that normally encountered and hence is truly a reverse attachment clasp. The full buccal and lingual arms provide efficient lateral force transmission and the near proximal extensions provide primary retention.

When a gingival direction of attachment is desired, these two flexible segments placed in the near proximal surface undercut are joined to gingival bars. The bars originate from the partial denture and rest on both the buccal and lingual gingival tissues (Fig. 23, B). They effect a connection of these flexible segments to the main part of the partial denture. Rigid thirds are placed on the buccal and lingual tooth surfaces (Fig. 23, C) to provide the lateral force transmission that these gingival bars fail to

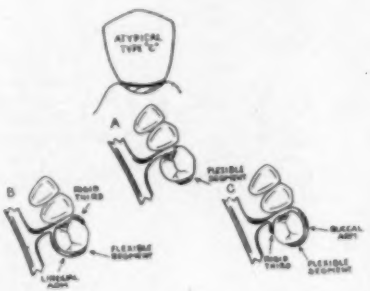

Fig. 19 • Clasp design for an atypical Type C survey line using a single flexible segment on the near proximal surface and a far direction of attachment. A: Flexible segment placed in undercut on near proximal surface. B: Far direction of attachment effected by use of a lingual arm. Rigid third on buccal surface for lateral force transmission and reciprocation. C: Far direction of attachment effected by use of a buccal arm. Rigid third on lingual surface for lateral force transmission and reciprocation

provide when substituted for the buccal and lingual arms of a circumferential type of clasp.

SUMMARY

To properly design the clasp component of a partial denture, an understanding of the basic functions of a clasp is essential. Primary retention and lateral force transmission are the basic functions to be considered in a clasp design.

Primary retention is effected by the flexible third of a clasp arm. It may contact a tooth surface in either of two ways: (1) active spring tension against a parallel sided or undercut tooth surface, or (2) passive placement against an undercut tooth surface.

Either will accomplish a resistance to vertical dislodgment; however, active spring tension brings with it the problems

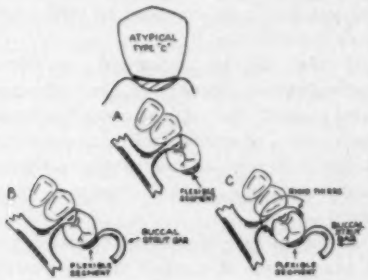

Fig. 20 • Clasp design for an atypical Type C survey line using a single flexible segment on the near proximal surface and a gingival direction of attachment. A: Flexible segment placed in undercut on near proximal surface. B: Gingival direction of attachment effected by use of a buccal strut bar. C: Rigid thirds are added both buccally and lingually to effect lateral force transmission

of clasp equilibrium. Intraclasp arm and interclasp equilibrium can rarely, if ever, be attained by the spring tension method of retention, whereas it is simply and safely attained by the passive contact method of retention.

The second clasp function, lateral force transmission to abutment teeth, is effected by placement of the rigid third of a clasp arm against a nonundercut tooth surface. If the supporting structure of an abutment tooth is unfavorable, supplementary measures are necessary to avoid overload and resultant damage by these lateral forces. These supplementary measures are multiple clasping, fixed splints and stress-breakers.

To effectively counteract forces resulting from these functional contacts and thereby avoid tooth movement, a clasp arm must:

1. Encompass more than 180 degrees of the tooth circumference (horizontal reciprocation).
2. Be placed on equal vertical levels as close to the gingivae as possible (vertical reciprocation).

When ideal clasp design is not feasible because of unfavorable tooth contour or

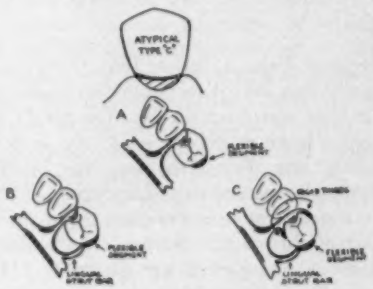

Fig. 21 • Clasp design for an atypical Type C survey line using a single flexible segment on the near proximal surface and a gingival direction of attachment. A: Flexible segment placed in undercut on near proximal surface. B: Gingival direction of attachment effected by use of a lingual strut bar. C: Rigid thirds are added to both buccal and lingual surfaces to effect lateral force transmission

tooth position, atypical clasping procedures embodying the basic functions of primary retention and lateral force transmission must be resorted to. Atypical clasp designs are dictated by three characteristic atypical survey lines. They may arbitrarily be typed as A, B and C. For the description of an atypical survey line, the surface (buccal or lingual) on which it occurs may be divided into the near zone (that half nearest to the edentulous area) and the far zone (that half away from the edentulous area).

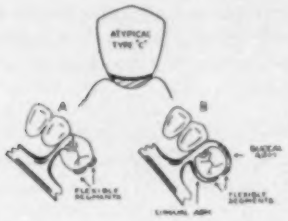

Fig. 22 • Clasp design for an atypical Type C survey line using two flexible segments on the near proximal surface and a far direction of attachment. A: Flexible segments placed in undercut on near proximal surface. B: Far direction of attachment effected by use of a buccal and a lingual arm

Atypical Type A Survey Line • This is a survey line that is too high (occlusal) in the near zone and too low (gingival) in the far zone as compared to the typical survey line. For retention, the flexible segment is placed in the undercut of the near zone. For its connection to the main part of the partial denture, three directions of attachment are available: (1) near direction resulting in a reverse loop clasp arm; (2) far direction resulting in a reverse attachment clasp arm, and (3) gingival direction resulting in a bar clasp arm.

Atypical Type B Survey Line • This is a survey line that is too high (occlusal) in the near and far zones as compared to the typical survey line. Two factors control clasp design with such a survey line. They are esthetics and the periodontium of the abutment tooth.

If esthetics is unimportant and the periodontium is good, the typical circumferential clasp arm may be designed at a high level.

If esthetics is important and the periodontium is good, semirigid and flexible thirds of the typical circumferential clasp arm may be eliminated on the buccal or labial surface.

If the periodontium is weak, ideal contour must be established on the abutment tooth by operative procedure, (grinding or restoration), to permit typical clasp arm design at the lowest possible vertical level.

Atypical Type C Survey Line • This is a survey line that is at the gingival margin in both the near and far zones. For such a survey line undercuts on (1) the distobuccogingival and distolinguogingival corners of adjacent teeth, (2) the far proximal surface and (3) the near proximal surface, may be used to effect primary retention.

If the distobuccogingival or distolinguogingival corner of an adjacent tooth is used, the typical circumferential clasp arm is extended from the abutment to the undercut corner of the adjacent tooth resulting in an extension clasp arm.

If the far proximal surface is used, one or two points of contact may be established by the flexible segment or segments depending on the available space. With this segment or segments, two directions of attachment are available. These may be described as follows:

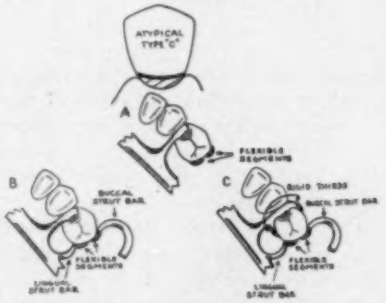

Fig. 23 • Clasp design for an atypical Type C survey line using two flexible segments on the near proximal surface and a gingival direction of attachment. A: Flexible segments placed in undercut or near proximal surface. B: Gingival direction of attachment effected by use of a buccal and a lingual strut bar. C: Rigid thirds are added both buccally and lingually to effect lateral force transmission

1. Near direction resulting in full buccal and lingual arms with far proximal surface extensions if two flexible segments are utilized, or a full buccal or lingual arm with a far proximal surface contact and only a rigid third on the opposite surface if one flexible segment is utilized.

2. Gingival direction resulting in one or two bar clasp arms according to the number of contacts with the flexible segment or segments. Rigid thirds are placed buccally and lingually to provide lateral force transmission.

If the near proximal surface is used, the clasp body, attached occlusal rest, and connecting upright are moved to the far proximal surface. One or two contacts of a flexible segment or segments may be used. Two directions of attachment are possible for the preferred contact. These directions may be described as follows:

1. Far direction resulting in a reverse attachment clasp with near proximal extensions if two flexible segments are utilized, or a reverse attachment buccal or lingual arm with a full near proximal surface contact and only a rigid third on the opposite surface if one flexible segment is utilized.

2. Gingival direction resulting in one or two bar clasp arms depending on the number of flexible segment contacts used. Rigid thirds are placed buccally and lingually for lateral force transmission.

The above procedures will permit the proper design of the clasp component of a partial denture regardless of whether typical or atypical conditions of tooth position and contour exist. The rationale and principles underlying their use will serve as an aid and guide in analyzing and evaluating any system of partial denture clasping.

1 Hanson Place

Antibiotic Agents • New antibiotic agents are reported at frequent intervals. The better known antibiotic agents (in addition to penicillin and aureomycin) include bacitracin, chloramphenicol (Chloromycetin), lupulon, neomycin, polymyxin and terramycin. Some of these antibiotics are effective against Gram-negative organisms, others are effective against Gram-positive organisms, and others such as chloramphenicol, neomycin and lupulon have a broader spectrum of activity. The recently isolated terramycin appears to have a wide bacterial spectrum.

Some antibiotics are only available for special clinical studies and few have been evaluated in respect to their possible uses in dentistry. *From Accepted Dental Remedies, ed. 16.*

Diameters of nerve fibers in human tooth pulps

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From a physiological point of view the dental innervation still entails problems which are far from solved. Histological study might here—as elsewhere in the field of neurophysiology—be useful and contribute to a better understanding of the functional aspects of dental innervation.

It is an old observation that the nerves supplying human teeth consist of small fibers.[1] The investigation reported here was undertaken in order to study quantitatively the relation between the different nerve fiber diameters; that is, "caliber groups," occurring in tooth nerves. The method adopted for this purpose was the so-called "fiber analysis," introduced by Häggqvist[2] in 1936 and used in several investigations of the central and peripheral nervous system published by the Department of Histology, Karolinska Institutet, Stockholm.

Healthy, noncarious teeth of both men and women, 12 to 44 years of age, were used; thus representing only permanent teeth. Twelve teeth were examined. Eleven were extracted from the maxilla and one from the mandible.

METHODS

As soon as the teeth had been extracted, two longitudinal grooves were drilled on the roots, the roots were split and the root pulp dissected free. Overheating was carefully avoided, since high temperatures cause the myelin sheaths of the different neurites to fuse into irregular masses, making it impossible to determine the precise caliber of the single fiber.[2] Figure 1 shows the result of overheating.

The root pulp was fixed during 48 hours in a 10 per cent neutral formaldehyde solution (original method of Häggqvist) or in a mixture of formaldehyde and acetic acid (Rexed's[3] modification, 1948). The fixative did not seem to influence the result, as the caliber curves were the same with both solutions. Consequently, the degree of shrinkage was approximately the same with the two fixative fluids used. After being rinsed in water the preparations were placed in a 5 per cent potassium dichromate solution for about one week. When embedded in paraffin the root pulps were cut into 5 micron sections. All sections examined were taken at the apical end of the root

*From the Department of Histology, Karolinska Institutet, Stockholm, Sweden.

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1. Koelliker, A., Handb. d. Gewebelehre III:96, 1902 (ed. 6).

2. Häggqvist, G., Analysis of nerve fibers in a cross-section of the spinal medulla. Ztschr. f. mikr. anat. Forsch. 39:1, 1936.

3. Rexed, B., A modified myelin staining method for paraffin sections. J. Neuropath. & Exper. Neurol. 7:462 (Oct.) 1948.

pulp, thus representing the same level of ramification or distal fiber tapering (Fig. 2). The cross section of each preparation, stained with the Alzheimer-Mann-Häggqvist (AMH) myelin sheath stain, was photographed at a linear magnification of × 750; the plates were fitted together to form a complete picture of the cross-sectioned root pulp. On the photomicrographs the nerve fiber diameters were measured in conformity with the principles devised by Häggqvist[2] (1936). Nerve fiber diameter in this investigation refers to the size of the nerve fiber including its myelin sheath.

In every root pulp specimen all nerve fibers were measured and classified in groups corresponding to their diameter as expressed in microns. The percentages of the different diameter groups were then calculated and a graph of the relative occurrence of different calibers was drawn. Hence an idea of the neurite caliber composition of the nerves was obtained.

RESULTS

As pointed out by several authors[4] the nerve fibers in the root pulp are arranged in a characteristic way, often encapsulating the blood vessels. This arrangement has often led to the supposition that the nerves were mainly vasomotor. In most cases the connective tissue, in which the neurite bundles are lying, is strongly basophilic, often with a tendency to metachromatic staining reaction. This basophilic ground substance shows fairly variable relations to the nerve tissue: sometimes it is strongly developed, whereas the enclosed nerve fibers are remark-

4. Lehner, J., and Plenk, H., The teeth. In Stoehr-von Moellendorff. Handb. d. mikr. anat. d. Mensch. 3:449, 1936.

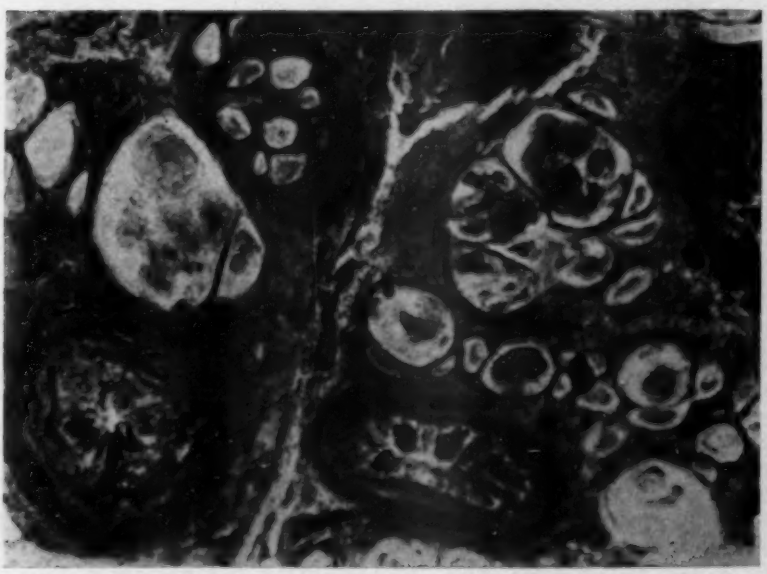

Fig. 1 • Shows irregular fusing of neurites in overheated specimen (X 1,290). AMH stain

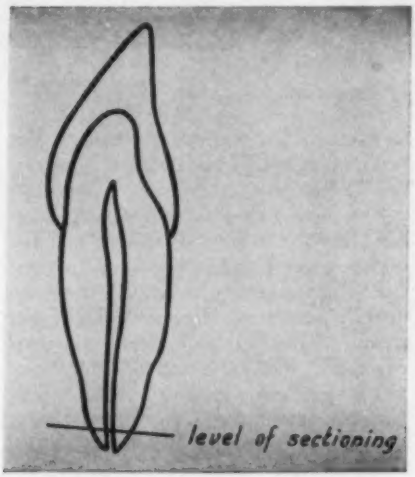

Fig. 2 • Site and level of sectioning

ably few; in other cases the basophilic tissue is less developed and surrounds the fiber bundles only in the shape of a thin zone (Figs. 3 and 4). Apart from the dense fiber bundles lying in the center of the root pulp, scattered fibers also occur in the periphery, immediately beneath the cell-free zone of Weil. The occurrence of such single fibers in the preparations is to be expected as the nerve fibers approach the structures to be innervated.

The caliber ranges of all teeth examined showed a noticeable preponderance of the small fibers (Fig. 5). In the table are reproduced among other data the upper caliber limits for the teeth examined, and the percentages of fibers equal to or less than 4 microns.

The coarsest fiber diameter varied between 4 and 13 microns. This upper caliber limit showed no relation to the average fiber size, which was about the same, irrespective of the size of the greatest fiber diameter. The number of fibers equal to or less than 4 microns varied between 82.8 and 99.3 per cent. The greatest number measured 2 to 3 microns.

The total number of myelinated fibers supplying the respective teeth was recorded. This number varied considerably. The myelinated fibers in an upper cuspid numbered 1,296, whereas in an upper bicuspid, from another person, only 151 myelin fibers were identified. In teeth with two roots, the total number of fibers was taken.

On a preparation, stained by the AMH method, the nonmyelinated fibers can be only rather roughly estimated. In the examined teeth their number varied between 40 and 650. These figures are not accurate; they are mentioned to show that the number of this type of fibers varies.

DISCUSSION

Several problems concerning the dental innervation are still open to discussion. It is now generally agreed that dentin (as well as cementum) is supplied with nerves in the shape of fine, fibrillar ramifications within and outside the dentinal tubules.[5,6] The existence of nerve endings in enamel has been claimed repeatedly, recently by Forshufvud,[7] but final proof is lacking.

The origin of the nerve fibers within the alveolar nerves is also uncertain: Leist[8] found no evidence supporting the theory that the teeth contain nerve fibers from the superior cervical ganglion, whereas it is possible that parasympathetic fibers from the lingual nerve may reach the teeth in the lower jaw. Christensen[9] found regressive changes in some of the nerve cells of the superior cervical

5. Berkelbach van der Sprenkel, H., The neurology of the teeth. Ztschr. f. mikr. anat. Forsch. 38:1, 1935.

6. Bernick, S., Innervation of the human tooth. Anat. Rec. 101:81 (May) 1948.

7. Forshufvud, S., A study of the paracapillary nutrition canals and their possible sympathetic innervation. Acta Odont. Scandinav. 7:1 (May) 1946.

8. Leist, M., The influence of the autonomous nervous system on teeth. Ztschr. f. Stomatol. 25:765 (Aug.) 1927.

9. Christensen, K., Sympathetic nerve fibers in the alveolar nerves and nerves of the dental pulp. J. D. Res. 19:227 (June) 1940.

ganglion when the pulps of teeth from one half jaw of a cat were excised. Brashear[10] believed the nonmyelinated fibers in the tooth nerves constituted approximately 25 per cent; other authors have made a lower estimate. It is sometimes difficult to distinguish between fine myelinated fibers and those generally designated as nonmyelinated. This is stressed by Bremer,[11] and Christensen[9] states that the nonmyelinated fibers are "thinly myelinated," as has been suggested by Schimert.[12]

Thus one has to consider the possibility that nerve fibers which are morphologically and commonly classified as nonmyelinated do not necessarily belong to the autonomous nervous system. Consequently it remains to be demonstrated whether the fibers here judged as nonmyelinated, as well as the myelinated fibers, could belong to the trigeminal nerve. This problem, however, cannot be approached exclusively on the basis of a morphological study but requires experimental work.

Previous investigations on the size of the dental nerve fibers have not been systematic. The dominance of the fine groups has been established long ago, but the relationship between the caliber groups has not been investigated. The most detailed study was carried out by Brashear,[10] who examined preparations impregnated with silver. This method is not suitable for investigating the diameter of the nerve fiber, as the myelin sheath is not stained by the silver. Brashear found that the upper diameter limit of pulp nerves was 10 microns; the majority of fibers (50 to 64 per cent) were less than 6 microns. In the periodontal space the diameter reached 12 microns, with 80 per cent of the fibers being less than 10 microns. Kocsis[13] examined two teeth, the pulps of which had been impregnated with osmium. In these specimens the maximum fiber caliber was 7 microns.

The figures reported in this investigation correspond with previous observations except as regards the smaller number of fibers less than 6 microns found by Brashear.[10] The latter worked with preparations decalcified and impregnated with silver, which might explain the discrepancy.

Several questions arise as a result of the present investigation. One is concerned with the nerve caliber ranges in

10. Brashear, A. D., Innervation of the teeth. J.A.D.A. 23:662 (April) 1936.

11. Bremer, G., Effect of denervation of teeth in monkey and dog. Diss. Stockholm, 1938.

12. Schimert, J., The formation of myelin sheaths in vegetative nerves. Ztschr. f. mikr. anat. Forsch. 37:581, 1935.

13. Kocsis, A. G., Contributions to the histology of human tooth pulp nerves. Schw. mschr. f. Zahnheilk. 55:1 (Jan.) 1945.

Fig. 3 • Nerve fibers from the pulp of maxillary left lateral incisor (X 290)

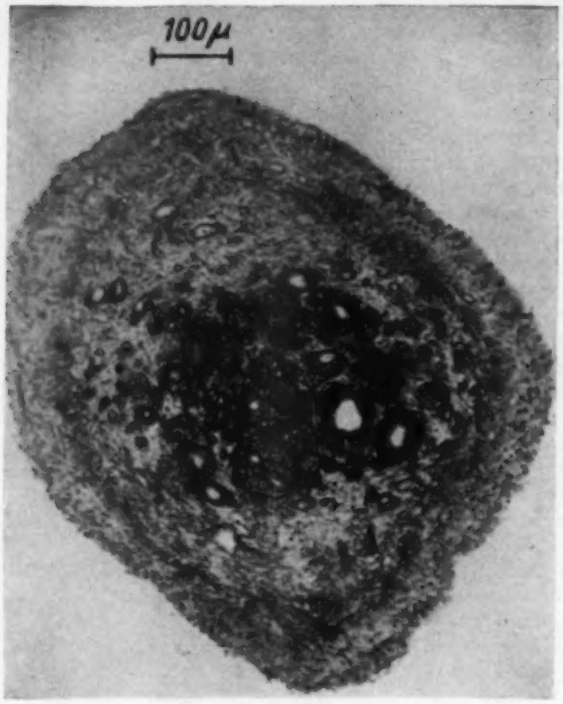

Fig. 4 • Nerve fibers from the pulp of maxillary right lateral incisor (X 120)

relation to function. It has long ago been stated that the only quality that could be felt by the teeth is pain, and the existence of a temperature sensibility has been repeatedly rejected.[14] Some of the nerve end organs observed in the dentin, on the basis of their mere morphological appearance (end-loops), have been thought to be capable of pressure perception. It is perhaps not advisable to interpret histological findings so freely. But where nerve fiber diameters are concerned there is a close correlation between morphology and function. The caliber ranges observed in this investigation show that the nerve fibers in the dental nerve supply have a diameter somewhat greater than that generally accepted as the upper limit for pain fibers. The caliber ranges of the dental nerve fibers show a considerable conformity with the caliber curves obtained by Sjöqvist[15] when he investigated the nerve fiber diameters in the descending spinal tract of the trigeminal nerve. Sjöqvist summarized his results thus: ". . . the vast majority of fibers have the same dimension as pain and temperature fibers . . ." whereas ". . . fibers which might be supposed to be tactile fibers occur only to a very inconsiderable extent. . . ."

Two types of pain reactions are present in the teeth: first and second responses.[16]

14. Orban, B. (editor), Oral Histology and Embryology. St. Louis: The C. V. Mosby Company, 1944.

15. Sjöqvist, O., Studies on pain conduction in the trigeminal nerve. Acta psychiat. et neurol., Suppl. 17, 1938.

16. Lewis, T., Pain. New York: The Macmillan Company, 1946.

The first one should be carried by fast conducting fibers; that is, fibers of larger diameter. This might correspond to the hypothetical existence of an "epicritic" versus a "protopathic" pain sensitivity.

When the upper limit of the nerve fiber diameter in the present work is considered, it must be borne in mind that the technic used gives rise to a shrinkage of about 25 per cent, according to Rexed.[17] A fiber measuring 12 to 13 microns (Fig. 6) thus has a real diameter of 15 to 16 microns.

17. Rexed, B., Contributions to the knowledge of the postnatal development of the peripheral nervous system in man. Acta Psychiat. et neurol. Supp. 33, 1944.

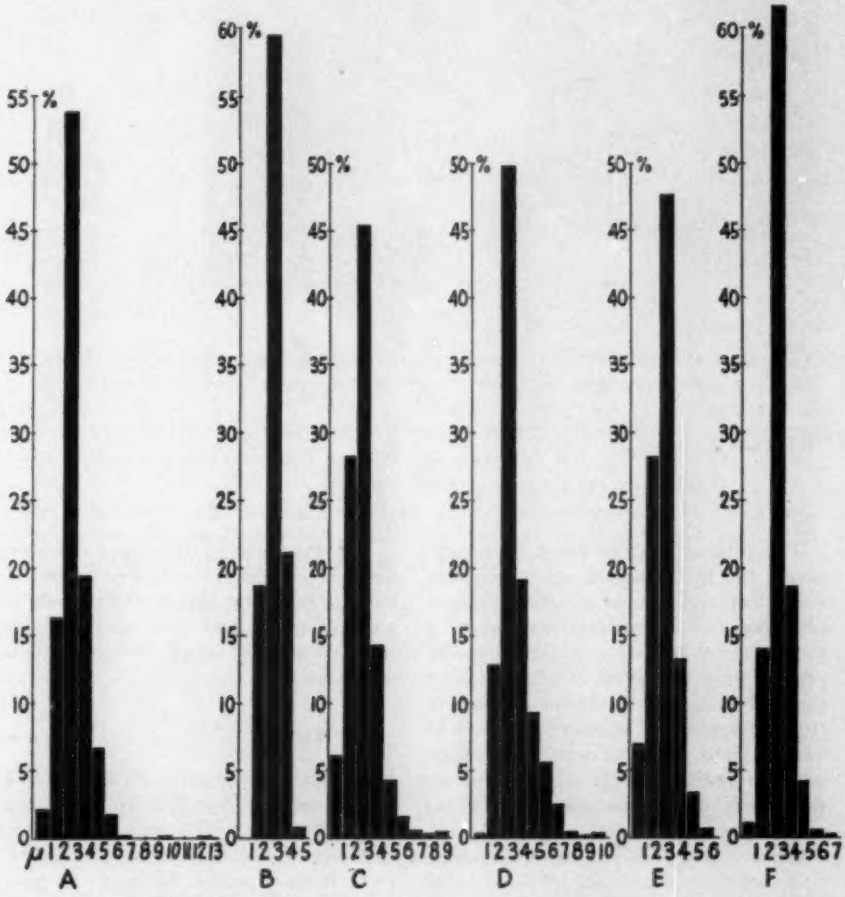

Fig. 5 • Distribution of sizes of nerve fibers in pulps of teeth examined. A: Mandibular right first bicuspid. B: Maxillary right first bicuspid. C: Maxillary left cuspid. D: Maxillary left central incisor. E: Maxillary left lateral incisor. F: Maxillary left first bicuspid; from the same patient as B

Table • Data on individual tooth pulps examined

Tooth	Sex	Age	Number of myelinated fibers	Approximate number of nonmyelinated fibers	Upper caliber limit in microns	Per cent of fibers equal to or less than 4 microns
Left cuspid	female	42	315	40	6	86.9
Right cuspid			390	100	6	94.8
Left lateral incisor			435	300	10	82.8
Mandibular right first bicuspid	male	21	1,135	400	13	91.3
Left cuspid	female	18	1,296	250	7	97.6
Left lateral incisor	male	44	257	250	7	85.1
Left lateral incisor	female	37	521	200	6	96.3
Left cuspid	male	28	721	*	9	93.3
Right lateral incisor			925	250	7	93.2
Left central incisor	female	24	991	*	10	91.4
Right first bicuspid	female	12				
lingual root			63	70	5	
buccal root			88	25	4	
			151	95		99.3
Left first bicuspid	female	12				
lingual root			125	350		
buccal root			332	300		
			457	650	7	95.2

*Fibers were not estimated.

The total number of nerve fibers supplying the teeth showed an appreciable variability, which must be looked upon as physiologic. The material examined is too limited to allow any conclusions concerning these variations. It is possible that the difference is the morphologic basis of the differences in sensitivity shown by various teeth. It is also open to discussion whether individual variations occur independent of fluctuations in reactivity to pain or other stimuli. Another possibility is that the variations in the abundance of nerve supply are reflected in the different degrees of vital reactions as tested according to Björn.[18] These and related questions will be the subject of further work.

The existence of true nonmyelinated fibers is a highly complicated matter. It has not been the aim of the present investigation to deal with this problem, the settlement of which demands experimental work.

SUMMARY

Systematic investigations on the nerve fiber diameters in dental nerves are lacking in the literature. The present investigation gives the caliber ranges of 12 healthy teeth from 9 people. Most of the fibers

18. Björn, H., Electrical excitation of teeth. Diss. Sv. Tandlak. tidskr., Supp. 39, 1946.

Fig. 6 • Nerve fibers from the pulp of mandibular right first bicuspid (X 750)

in the root pulps were small with 82.8 to 99.3 per cent being equal to or less than 4 microns.

The upper limit of the dental nerve fiber diameter varied between 5 and 13 microns.

The total number of fibers varied considerably, the extreme figures being 151 to 1,296 fibers per single tooth. It has not been possible to correlate these variations with any outstanding features, such as age of patient, size of tooth and so forth. It is possible that information can be obtained on this point when more specimens have been investigated.

The observations suggest some relation between caliber ranges and nerve function.

The Patient's Emotional Needs • A dentist or a physician or an anesthetist will never reach the optimal results in his own field regardless of his diagnostic acumen or his manual dexterity and skill if he does not take into consideration the patient's emotional needs. The ability to understand and handle a patient's emotional needs extends the scope and usefulness of the doctor. *Bernard B. Raginsky, "Some Psychosomatic Aspects of General Anesthesia," Anesthesiology 11:399, July 1950.*

COUNCIL ON HOSPITAL DENTAL SERVICE

List of approved hospital dental departments, June, 1951

One of the duties of the Council on Hospital Dental Service is to examine dental departments of hospitals and issue certificates of approval in the name of the American Dental Association to hospitals having dental departments which meet basic standards approved by the House of Delegates. The Council maintains a list of such hospitals, which on occasion is published in THE JOURNAL. The following list includes the names of hospitals published previously in addition to those approved during the past year up to July 1, 1951.

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Jefferson-Hillman Hospital, Birmingham 5. Joseph P. Lazansky, M.D., D.M.D., Director, Clinics

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Missouri Pacific Hospital, Little Rock. James M. Fowler, D.D.S., Chief, Dental Service

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Herrick Memorial Hospital, Berkeley. Lyall O. Bishop, D.D.S., Chief, Oral Surgery

San Diego County General Hospital, San Diego. Roy O. Stephens, Jr., D.D.S., Chief, Dental Staff

Stockton State Hospital, Stockton. John F. McCarthy, D.D.S., Senior Dentist

CONNECTICUT

Fairfield State Hospital, Newtown. L. J. Berdon, D.D.S., Senior Institution Dentist

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Saint Mary's Hospital, Waterbury. Bernard A. O'Hara, D.D.S., Chief, Dental Department

Waterbury Hospital, Waterbury. Irving E. Wallace, Chairman, Service of Dentistry

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Episcopal Eye, Ear and Throat Hospital, Washington. H. W. Krogh, D.D.S., Chief, Dental Department

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Saint Elizabeths Hospital, Washington. Earl B. Frank, D.D.S., Chief, Dental Department

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Jackson Memorial Hospital, Miami. Thomas J. Cook, D.D.S., Director, Oral Surgery Service

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Chicago State Hospital, Chicago. Victor L. Griseto, D.D.S., Director, Dental Department

The Children's Memorial Hospital, Chicago. Gordon Henry Rovelstad, D.D.S., M.S.D., Director, Dental Dept.

Peoria Municipal Tuberculosis Sanitarium, Peoria. D. H. Fraser, D.D.S., Director, Dental Department

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Letterman Army Hospital, San Francisco, Calif. M. H. Welch, D.D.S., Chief, Dental Service

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Walter Reed General Hospital, Washington, D.C. N. A. Harper, D.D.S., Chief, Dental Service

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U.S. Naval Hospital, Pensacola, Fla. John H. Atkins, D.D.S., Chief, Dental Service

U.S. Naval Hospital, Guam, M.I. K. L. Urban, D.D.S., Chief, Dental Service

U.S. Naval Hospital, Great Lakes, Ill. F. C. Snyder, D.D.S., Chief, Dental Service

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U.S. Naval Hospital, Philadelphia, Pa. J. L. Purcell, D.D.S., Chief, Dental Service

U.S. Naval Hospital, Newport, R.I. Edward C. Raffetto, D.D..S, Chief, Dental Service

U.S. Naval Hospital, Quantico, Va. L. S. Hanson, D.D.S., Chief, Dental Service

U.S. Naval Hospital, Portsmouth, Va. J. B. Bancroft, D.D.S., Chief, Dental Service

U. S. PUBLIC HEALTH SERVICE

U. S. Marine Hospital, San Francisco, Calif. Fritz R. Jackson, D.D.S., Dental Director

U. S. Marine Hospital, Chicago, Ill. J. E. Unsworth, D.D.S., Chief, Dental Department

U. S. Marine Hospital, New Orleans, La. L. R. Etzenhouser, D.D.S., Chief, Dental Section

U. S. Marine Hospital, Baltimore, Md. R. S. Lloyd, D.D.S., Chief, Dental Service

U. S. Marine Hospital, Brighton, Mass. Howard J. Woodbridge, D.D.S., Chief, Dental Service

U. S. Marine Hospital, Staten Island, N.Y. R. H. Moore, D.D.S., Chief, Dental Service

U. S. Marine Hospital, Cleveland, Ohio. H. G. Trautman, D.D.S., Sr. Dental Surgeon

U. S. Marine Hospital, Norfolk, Va. William C. Neaff, D.D.S., Senior Dental Surgeon

U. S. Marine Hospital, Seattle, Wash. G. E. Jones, D.D.S., Senior Dental Director

VETERANS ADMINISTRATION

VA Hospital, Tuskegee, Ala. Clifton O. Dummett, D.D.S., Chief, Dental Service

VA Hospital, North Little Rock, Ark. D. L. Hilton, D.D.S., Chief, Dental Service

VA Hospital, Fayetteville, Ark. F. D. Knox, D.D.S., Chief, Dental Service

VA Hospital, Long Beach, Calif. James B. Taylor, D.D.S., Chief, Dental Dept.

VA Center, Los Angeles, Calif. Earl B. Rousseau, D.D.S., Chief, Dental Service

VA Hospital, Oakland, Calif. Dyle R. Downing, D.D.S., Chief, Dental Department

VA Hospital, Palo Alto, Calif. John W. Bleasdale, D.D.S., Chief, Dental Service

VA Hospital, San Fernando, Calif. John W. Harryman, D.M.D., Chief, Dental Service

VA Hospital, San Francisco, Calif. H. A. Single, D.D.S., Chief, Dental Service

VA Hospital, Fort Logan, Colo. W. S. Lee, D.D.S., Chief, Dental Service

VA Hospital, Grand Junction, Colo. Kemp Martin, D.D.S., Chief, Dental Service

VA Hospital, Newington, Conn. William J. Townsend, D.D.S., Chief, Dental Department

VA Hospital, Wilmington, Del. Charles C. Sesso, D.D.S., Chief, Dental Service

VA Center, Bay Pines, Fla. W. H. Hatcher, D.D.S., Chief, Dental Service

VA Hospital, Coral Gables, Fla. L. M. Childers, D.D.S., Chief, Dental Service

VA Hospital, Augusta, Ga. James F. Amick, D.D.S., Chief, Dental Service

VA Hospital, Boise, Idaho. G. H. Jones, D.D.S., Chief, Dental Service

VA Hospital, Downey, Ill. D. E. Riedl, D.D.S., Chief, Dental Service

VA Hospital, Dwight, Ill. W. L. Westling, D.D.S., Chief, Dental Service

VA Hospital, Indianapolis, Ind. C. Newman, D.D.S., Chief, Dental Service

VA Hospital, Des Moines, Iowa. J. W. Baldwin, D.D.S., Chief, Dental Service

Winter VA Hospital, Topeka, Kan. Mark W. Divine, D.D.S., Chief, Dental Service

VA Center, Wadsworth, Kan. James P. Darnell, D.D.S., Chief, Dental Department

VA Hospital, Louisville, Ky. Eugene J. Murphy, D.D.S., Chief, Dental Service

VA Hospital, Outwood, Ky. J. W. Nixon, D.D.S., Chief, Dental Service

VA Hospital, Alexandria, La. Dewitt T. Baker, D.D.S., Chief, Dental Service

VA Hospital, New Orleans, La. Walter R. Dixon, D.D.S., Chief, Dental Service

VA Hospital, Fort Howard, Md. Frederick S. Maier, D.D.S., Chief, Dental Service

VA Hospital, Perry Point, Md. George G. Lynch, D.D.S., Chief, Dental Service

VA Hospital, Bedford, Mass. Oscar R. Reed, D.D.S., Chief, Dental Service

VA Hospital-Cushing, Framingham, Mass. Donald F. McCloskey, D.M.D., Chief, Dental Service

VA Hospital, Northampton, Mass. Gerald F. Bredbury, D.M.D., Chief, Dental Service

VA Hospital, Rutland Heights, Mass. Bert W. Newton, D.D.S., Chief, Dental Service

VA Hospital, Dearborn, Mich. Paul B. Eib, D.D.S., Chief, Dental Service

VA Hospital, Fort Custer, Mich. E. W. Stevens, D.M.D., Chief, Dental Service

VA Hospital, Gulfport, Miss. Lucius F. Ewell, D.D.S., Chief, Dental Service

VA Center, Fort Harrison, Mont. Edward F. Keys, D.D.S., Chief, Dental Service

VA Hospital, Lincoln, Neb. Marion R. Smith, D.D.S., Chief, Dental Service

VA Hospital, Lyons, N.J. Walter J. Baumgartner, D.D.S., Chief, Dental Service

VA Hospital, Brooklyn, N.Y. Jacob W. Wisan, D.D.S., Chief, Dental Service

VA Hospital, Buffalo, N.Y. Russell W. Groh, D.D.S., Chief, Dental Service

VA Hospital, Oteen, N.C. I. H. Archer, D.D.S., Chief, Dental Service

VA Hospital, Brecksville, Ohio. Joseph L. Maxwell, D.D.S., Chief, Dental Service

VA Hospital, Chillicothe, Ohio. William Stranathan, D.D.S., Chief, Dental Service

Crile Veterans Administration Hospital, Cleveland, Ohio. Clinton T. Brann, D.D.S., Chief, Dental Service

VA Center, Dayton, Ohio. C. M. Logsdon, D.D.S., Chief, Dental Service

VA Hospital, Muskogee, Okla. W. W. Chase, D.D.S., Chief, Dental Service

VA Hospital, Oklahoma City, Okla. William C. Davis, D.D.S., Acting Chief, Dental Service

VA Hospital, Portland, Ore. Ernest R. Nichol, D.M.D., Chief, Dental Service

VA Hospital, Roseburg, Ore. William F. Amiot, D.D.S., Chief, Dental Department

VA Hospital, Aspinwall, Pa. F. M. Ewing, D.D.S., Chief, Dental Service

VA Hospital, Coatesville, Pa. John L. Deimler, D.D.S., Chief, Dental Service

VA Center, V. A. San Patricio Hospital, San Juan, P.R. Guillermo T. Calderon, D.D.S., Chief, Dental Department

VA Hospital, Providence, R.I. B. H. Sawyer, D.M.D., Chief, Dental Service

VA Hospital, Memphis, Tenn. Charles G. Kadison, D.D.S., Chief, Dental Service

VA Hospital and Center, Mountain Home, Tenn. Harrison V. Talbert, D.D.S., Chief, Dental Service

VA Hospital, Murfreesboro, Tenn. Elmer L. Miller, D.D.S., Chief, Dental Officer

VA Hospital, Nashville, Tenn. L. D. Heacock, D.D.S., Chief, Dental Service

VA Hospital, Amarillo, Texas. Charles A. Wendell, D.D.S., Chief, Dental Service

VA Center, White River Junction, Vt. L. R. Leon, D.D.S., Chief, Dental Service

VA Hospital, Spokane, Wash. Harold A. Wilson, D.D.S., Chief, Dental Service

VA Center, Wood, Wis. E. V. Millard, D.D.S., Chief, Dental Officer

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

Indexes of dentists' fees and other price indexes

Once each month the daily newspapers of the country publish a statistic which is often called the "cost of living index." This figure is computed by the Bureau of Labor Statistics of the U. S. Department of Labor, and its official name is Consumers' Price Index for Moderate-Income Families in Large Cities. Within recent years many firms have geared their wages and salaries to the Consumers' Price Index.

Dentists' fees are one of approximately 200 items which are regularly priced and included in the make-up of the Consumers' Price Index. The 200 items are chosen as a representative sample of the more than 1,400 articles and services purchased by American families. Each of the 200 items is weighted in the index according to the spending patterns of the average family. As spending patterns change, weights given to the various

Table 1 • Indexes of medical and dental care costs in large cities, 1935–1950 (1935–39 = 100)

	Dentists' fees				Physicians' fees	Hospital rates	Optical services	Prescriptions and drugs	Drugs, medical and dental care, combined
	Total	Fillings	Extractions	Cleaning teeth					
1935	98.4	97.8	98.5	98.8	99.3	96.7	99.5	99.7	99.0
1936	98.6	97.7	99.0	99.1	99.9	97.6	99.4	99.5	99.3
1937	100.9	101.2	100.6	100.7	100.3	100.3	100.2	100.0	100.3
1938	101.0	101.5	100.7	100.6	100.2	102.5	100.1	100.6	100.6
1939	101.1	101.6	101.1	100.6	100.4	103.0	101.0	100.3	100.7
1940	101.1	101.8	100.8	100.5	100.3	103.5	101.8	99.9	100.8
1941	101.5	102.4	101.1	101.0	100.7	105.5	102.0	100.8	101.4
1942	104.1	105.7	103.0	103.0	102.9	113.7	103.1	103.1	104.2
1943	108.8	109.2	107.8	108.8	109.5	122.8	106.8	103.8	109.2
1944	114.8	113.8	115.1	115.2	113.9	128.3	109.0	104.7	112.6
1945	119.7	118.8	121.4	119.5	116.6	132.3	110.1	105.6	115.3
1946	126.9	127.3	128.4	125.8	122.4	150.6	112.1	107.5	121.6
1947	137.4	137.7	139.0	—	130.2	179.6	118.6	115.4	131.6
1948	144.8	145.1	146.8	—	135.5	209.7	123.6	121.5	140.1
1949	150.6	150.9	152.9	—	137.9	226.8	127.6	123.3	144.9
Mar. 1950	152.3	152.5	155.1	—	139.5	233.0	128.2	123.7	146.8
June 1950	154.0	154.3	156.3	—	139.6	233.1	128.5	123.9	147.2
Sept. 1950	155.5	155.7	158.1	—	140.7	235.2	128.5	125.7	148.6
Dec. 1950	156.9	157.2	159.6	—	141.3	244.7	131.2	127.1	150.7

Source: Bureau of Labor Statistics, U. S. Department of Labor

items are altered. Dentists' fees are considered to be less than 1 per cent of the expenditures of the typical family.

Pricing of food is carried out in 56 large cities and of other articles and services in 34 large cities. The index base (100) is the average for the years 1935 through 1939. Thus, if the index for an article is 175, its price is 75 per cent higher than it averaged during 1935-1939.

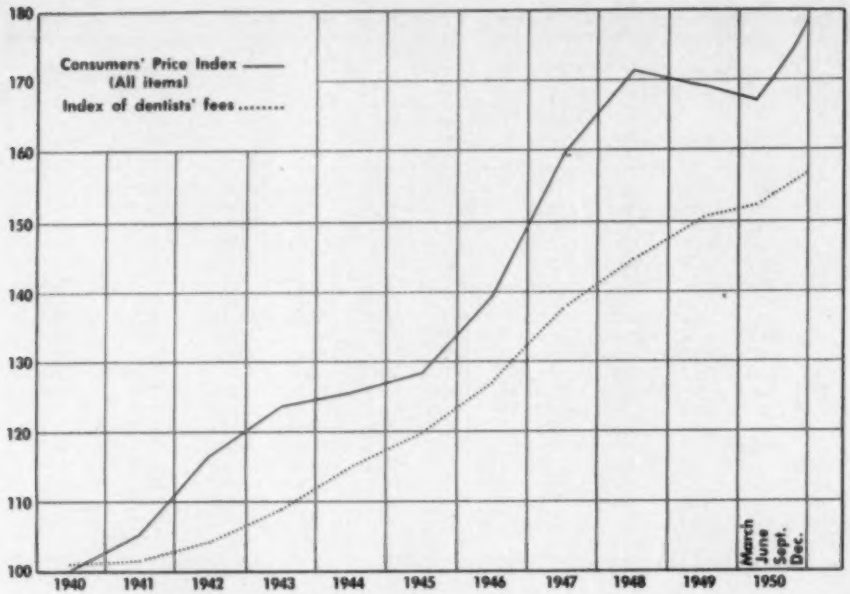
As will be seen from Table 1 and the chart, dentists' fees have risen considerably less than the over-all cost of living. In December 1950 the Consumers' Price Index for the nation stood at 178.4, while the index for dentists' fees was only 156.9. In other words, while prices in general increased 78.4 per cent, dentists' fees increased only 56.9 per cent.

It will be noted that the increase in dentists' fees has been more gradual and sustained than that of all prices. The Consumers' Price Index rose sharply in the period following the end of World War II and lifting of price controls, but receded slightly in 1949 and early 1950. By comparison, the index for dentists' fees has never receded during the past 15 years, nor has it shown any severe increase from one year to the next.

While the indicated rise in physicians' fees is less than that for dentists, the increase in hospital rates has been much greater. The cost of prescriptions and drugs has risen comparatively little.

The Bureau of Labor Statistics depends upon regular reports from certain dentists in developing these indexes. Since the index is a measure of current prices relative to earlier prices, a degree of accuracy is lost when a participating dentist discontinues reporting and must be replaced by another dentist.

In interpreting the index for dentists' fees, it should be borne in mind that only two items of dental care, extractions and fillings, are at present being priced. Until mid-1947, prophylaxes were also priced. Since then, the index



Consumers' Price Index for Moderate-Income Families in Large Cities, and index of dentists' fees, 1940-1950 (1935-1939=100). Source: Bureau of Labor Statistics, U.S. Department of Labor

Table 2 • Consumers' Price Index for Moderate-Income Families in Large Cities, by groups of articles and services, 1935–1950 (1935–1939 = 100)

	All Items (C.P.I.)	Food	Apparel	Rent	Fuel, electricity & refrig.	House furnishings	Miscellaneous
1935	98.1	100.4	96.8	94.2	100.7	94.8	98.1
1936	99.1	101.3	97.6	96.4	100.2	96.3	98.7
1937	102.7	105.3	102.8	100.9	100.2	104.3	101.0
1938	100.8	97.8	102.2	104.1	99.9	103.3	101.5
1939	99.4	95.2	100.5	104.3	99.0	101.3	100.7
1940	100.2	96.6	101.7	104.6	99.7	100.5	101.1
1941	105.2	105.5	106.3	106.2	102.2	107.3	104.0
1942	116.5	123.9	124.2	108.5	105.4	122.2	110.9
1943	123.6	138.0	129.7	108.0	107.7	125.6	115.8
1944	125.5	136.1	138.8	108.2	109.8	136.4	121.3
1945	128.4	139.1	145.9	108.3	110.3	145.8	124.1
1946	139.3	159.6	160.2	108.6	112.4	159.2	128.8
1947	159.2	193.8	185.8	111.2	121.2	184.4	139.9
1948	171.2	210.2	198.0	117.4	133.9	195.8	149.9
1949	169.1	201.9	190.1	120.8	137.5	189.0	154.6
Mar. 1950	167.0	196.0	185.0	122.9	140.9	185.4	155.0
June 1950	170.2	204.6	185.0	123.9	138.9	185.2	155.3
Sept. 1950	173.8	208.5	190.5	124.8	141.8	195.4	158.8
Dec. 1950	178.4	215.4	196.4	125.8	144.1	204.8	162.0

Source: Bureau of Labor Statistics, U. S. Department of Labor

for dentists' fees has been weighted by the price of prophylaxes, but this price has been assumed from the relationship it bore to the prices of the other two dental items in mid-1947.

As shown in Table 2, the prices of food, clothing and house furnishings have risen much more than the prices of fuel, electricity, refrigeration and rent. Dentists' fees are included in the "miscellaneous" group in Table 2, along with physicians' fees, hospital rates, optical services, prescriptions and drugs, household operation, recreation, personal care and transportation.

B. Duane Moen, Director

COUNCIL ON DENTAL HEALTH

Children's dental health day: report on third national observance

In a questionnaire regarding the observance of national Children's Dental Health Day, celebrated this year for the third time on the first Monday in February, the Council on Dental Health asked chairmen of state and local committees the following question: What immediate results can you attribute to your Children's Dental Health Day program? The long range benefits of this observance cannot be measured with ease; however, the immediate benefits are significant in future planning for the improvement of dental health. The two most frequently mentioned benefits were an increasing interest in dental health on the part of the public and an increasing interest in dentistry for children on the part of dentists. Owing to the lack of space, the many excellent reports cannot be discussed here in detail.

PUBLIC INTEREST IN DENTAL HEALTH

Subjects brought to the attention of the public on Children's Dental Health Day included the prevalence of dental disease, preventive measures carried out by the dental profession and the various governmental health agencies, the importance of regular home care and professional care, and the value of sustained community dental programs including dental care for children. Emphasis also was given to the fact that dental care is a basic health service. Prevention was the keynote in the majority of programs.

A growing awareness on the part of the public that dentists are sincerely interested in promoting dental health for every American child as demonstrated by their sponsorship of Children's Dental Health Day was observed by the California State Dental Association. Parents, teachers and other adult groups in Chattanooga, Tenn., commented that never before had a program in health education appealed so much to the mass of children and adults. The growing interest in dental health is shown by the fact that this year more communities than ever before celebrated the occasion. The Philippines had its first country-wide observance, in accordance with President Quirino's proclamation. The expressed

purpose of the observance was "to arouse the dental health consciousness of the people."

Through the newspapers, radio, television and school and community programs, the public again was reminded by dental societies and other health organizations of the importance of care of the mouth. Another means used for the dissemination of dental health information was speeches presented by dentists before school and community groups. Motion pictures also were helpful. Many dental societies offered cash and savings bonds as prizes to stimulate interest in essay and poster contests.

Parents are taking cognizance of the day as shown by the fact that an ever-increasing number of children are appearing in dentists' offices. Immediately after February 5, many children came to the dentist for their first appointment and many others for long overdue appointments. Greater interest in the care of deciduous teeth and in the relation of the teeth to health has been noted. In fact, inquiries concerning all aspects of children's dentistry have increased, particularly with regard to caries prevention and orthodontic problems, it was reported by New Haven, Conn.

In numerous areas the observance of Children's Dental Health Day has resulted in a continually expanding community dental health program. In California, Merced County, during Children's Dental Health Week, officially opened a dental health program in the schools. Mansfield, Ohio, reported cooperation of schools in a dental program, assistance by the Parent-Teacher Association and improvement in the attitude of the general public toward dental health.

Many Indiana communities have instituted programs in which local dental societies cooperate with schools, health authorities and civic groups. In Indiana, the theme for the 1951 observance was expansion of these programs to make dental health and care available to all children.

The occasion stimulated an unprecedented number of requests for dental health education material, as reported by Maryland. In Washington, D. C., an educational film library was started. In New York, more agencies outside the dental profession cooperated than in the past.

A greater interest in fluoridation was demonstrated on the part of teachers, public officials and the public in general. One leading candidate for a public utilities commission in Tennessee included the fluoridation of water in his platform. In Illinois, subsequent to the distribution of literature on Children's Dental Health Day, many communities expressed a desire for fluoridation of the communal water supply. The Junior Chamber of Commerce in Knoxville, Tenn. passed a resolution, which was sent to the city council and the utilities board, recommending fluoridation of the local water supply as a means for improving dental health.

Numerous lay meetings devoted to dentistry for children were held throughout the country. In Shreveport, La., enough interest was stimulated so that dentistry now is represented on the health committee of the Chamber of Commerce.

In Kansas, the various activities were designed to stimulate interest in good dental health practices. The cooperation of dentists throughout the state made possible for the second consecutive year school dental health programs in the 105 counties. With this record, the goal expressed in the governor's proclamation comes nearer to realization; namely, "that no child in Kansas will lose teeth because of the lack of proper dental health education and care."

In Portland, Me., two dental hygienists cleaned children's teeth in full view of the shoppers in a downtown store window.

In Fall River, Mass., emphasis was placed on the completion of the Medical Health Center, where the dental clinic will be located. The audiovisual director indicated willingness to procure such educational aids as dental health literature, motion pictures and models.

PROFESSIONAL INTEREST IN DENTISTRY FOR CHILDREN

The importance of dental health for children is brought pointedly to the attention of dentists, as well as lay persons, by the observance of Children's Dental Health Day. There has been a tremendous increase of professional and lay interest in dentistry for children, according to the New Jersey report. The chairman reported that plans are already under way for the 1952 observance. Physicians also are showing a greater interest in dental caries and its prevention.

Some dentists have expressed themselves as not in sympathy with the idea of a day or week set aside for dentistry for children. However, this one day celebration should be regarded as merely a token observance—a spearhead. Actually every day must be children's dental health day. A dental program to be most effective must be a year-round cooperative effort of both the lay public and the dental and medical professions. It was predicted in the report from Nevada that in the not too far distant future 60 per cent or more of the dentist's time will be devoted to children.

In many communities the dental profession held special scientific meetings on dental care for children. One example, in keeping with the nationwide observance, was a panel discussion entitled "A New Look at Dental Health," conducted at Andrews Air Force Base, Washington, D. C.

Children's Dental Health Day encourages greater participation of dentists in activities to promote the welfare of the community. Examples are topical fluoride applications, fluoridation of public water supplies and surveys to determine the results of these preventive measures. In Denver, Colo., examination and dental treatment for orphans and indigent children will be provided. A group in Louisiana, consisting of about 12 dentists, is donating one hour per week each to the underprivileged children at the local high schools.

One constituent dental society reported that observance of the day provided an opportunity to get many of the inactive component societies interested in a community project. It also served to bring the dental profession and school health service groups closer together.

COMMENT

In the interest of health for the American people, every effort must be made to reduce the size of the dental problem. Dental health education, dental research, dental treatment and prevention —all are important in a complete and effective dental program, and each is dependent on the others.

In evaluating the results of Children's Dental Health Day on the basis of dental health education of the public and an increased professional interest in dentistry for children, one must conclude that the observance was a success. The word "success" as here used does not mean that an optimum situation exists but rather that progress was made toward the goal of improvement in dental health. The attainment of the goals for which Children's Dental Health Day was designed will depend largely on the continuation of activities throughout the year.

COUNCIL ON DENTAL THERAPEUTICS

Council announces classification of additional products

The classification of products by the Council on Dental Therapeutics of the American Dental Association has been described in a previous report (*J.A.D.A.* 40:489, April, 1950). The Council's program now provides for classification of products in Group A, Group B, Group C and Group D. Products are reconsidered periodically and decisions are subject to change at any time that a substantial amount of new evidence becomes available. The files of the Council contain information on many drugs and dental cosmetics, and inquiries are welcome.

GROUP A

Listing of products in Group A means that at the time of their consideration, the items conformed with the provisions of acceptance established by the Council on Dental Therapeutics and adopted by the Board of Trustees of the American Dental Association. Items in this group will be listed in *Accepted Dental Remedies,* and may use the Seal of Acceptance, unless otherwise provided.

The following additional products are classified in Group A:

Procaine HCl 4%, Neo-Synephrine HCl 1:2500 (High Chemical Co.): Each cc. is stated to contain procaine HCl, 0.04 Gm.; phenylephrine HCl, 0.0004 Gm.; sodium bisulfite, 0.002 Gm.; sodium chloride, 0.0002 Gm., and distilled water. Marketed in 2.3 cc. cartridges. See *A.D.R.*, ed. 16, p. 29.

Procaine HCl 2%, Epinephrine 1:25,000 (High Chemical Co.): Each cc. is stated to contain procaine HCl, 0.02 Gm.; epinephrine, 0.00004 Gm.; sodium chloride, 0.005 Gm.; sodium bisulfite, 0.0019 Gm., in distilled water. Marketed in 2.3 cc. cartridges. See *A.D.R.*, ed. 16, p. 29.

Penicillin Dental Cones with Sulfanilamide (Novocol Chemical Mfg. Co., Inc.): Each cone is stated to contain crystalline sodium penicillin, 15,000 units, and sulfanilamide, 0.5 grain. See *A.D.R.*, ed. 16, p. 39.

Cetylcide Germicidal Concentrate for Instrument Disinfection (Cetylite Industries, Inc.): Stated to contain cetyl dimethyl ethyl ammonium bromide, 6.5 per cent; benzalkonium chloride, 6.5 per cent; isopropyl alcohol, 13 per cent; sodium nitrite, 11 per cent; and inert ingredients, 63 per cent. This is a concentrated dosage form intended for dilution with approximately 100 times its volume of water. See *A.D.R.*, ed. 16, p. 50, 51.

GROUP B

Listing of products in Group B means that there is insufficient evidence to justify their present acceptance, but there is reasonable evidence of their usefulness and safety. These products meet the other qualifications and standards established by the Council on Dental Therapeutics and the Bureau of Chemistry. It is the Council's opinion that Group B products may be promoted for special use and study.

GROUP C

Listing of products in Group C means that the evidence is so limited or inconclusive that the products cannot be accurately evaluated. It is the Council's opinion that Group C products require further study by qualified investigators.

GROUP D

Listing of products in Group D means that they are unacceptable because of their demonstrated inability to meet the standards outlined in the provisions for acceptance.

JUDICIAL COUNCIL

The Judicial Council of the American Dental Association is required to render many opinions and decisions each year. Some of these opinions afford interesting reading as well as guides to reasonable conduct. In publishing them, all parts are deleted that would identify the inquirers or those whose names may be associated with the controversy. The questions raised in the following inquiries are covered by the Principles of Ethics of the American Dental Association, copies of which may be secured by writing to the Central Office of the Association.

ETHICAL PRACTICES

Question • A dentist in this community has a specialist's license and for several years he limited his practice to his specialty. Recently he resumed some general practice. How is he to let the fact be known that he limits part of his practice to a specialty and what per cent of his practice should be devoted to his special field?

His name is listed in the telephone directory under specialists and also under general practitioners. In no other place, either on his stationery or elsewhere does this information appear. The ethics of the double listing in the telephone directory has been questioned. Please give me your opinion.

D.D.S., South Carolina

Reply • The basis of an answer to your question is fairly well outlined in Sections 18 and 19 of the new "Principles of Ethics" of the Association adopted by the House of Delegates in October 1950.

Section 18. Limitation of Practice • A dentist may indicate the limitation of his practice to one of the approved specialties in dentistry on his card, letterhead, announcements and office sign provided that such indication in style and text is consistent with the custom of the dentists of the community.

Section 19. Directories • A dentist may permit the listing of his name in a directory provided that all dentists in similar circumstances have access to a similar listing and provided that such listing is consistent in style and text with the custom of the dentists of the community.

A review of the "law governing the practice of dentistry and dental hygiene in South Carolina" and especially the amendment (calendar no. 563) by the legislature in 1945 relative to ". . . a license to practice a Specialty, . . ." indicates that listing the name of a dentist in the telephone directory under "Dentists —Oral Surgery" even though approximately 40 per cent of his practice is outside that field, is not in violation of the laws of South Carolina.

It is noted that the dentists of his community permit or cooperate in an arrangement whereby dentists are listed in the telephone directory under, first, dentists and then under dentist-oral surgery, dentist-orthodontist, and so on. I believe it would be more in keeping with the dignity of the profession if all dentists were listed under the general heading of dentists. If a dentist limits his practice, the limitation would be indicated after his name. Thus his name would appear in but one place in the classified section of the telephone directory.

A strict interpretation of the new "Principles of Ethics" suggests that members of the Association will be discouraged from listing themselves as oral surgeons (or practice limited to oral surgery) unless the practitioner actually limits his services completely to that one specialty. This is because the approved

specialty board in this field requires this limitation of those who so designate themselves. This is not true of all other specialties as, for instance, in pedodontia, for the reason that the American Board of Pedodontics does not require complete limitation of practice to the field of pedodontia. It appears, therefore, that the dentist in question in designating himself in effect as a specialist in oral surgery does not violate the dental practice act of South Carolina but at the same time he does not conform to the requirements outlined in our Association's present "Principles of Ethics."

While the question is not asked I believe I should add to the above that the American Dental Association is not prepared to object to anyone listing himself on his professional cards, letterheads or permissible office door lettering as "practice limited to . . ." if the dentist so limits his practice.

Chairman, Judicial Council

Question • I am a member of the Dental Society of this District and in good standing. I am manufacturing and getting ready to sell a vitamin tonic which is incorporated under the laws of this State as Dr. ——— Corporation, the majority of the stock belonging to me personally.

Will I in any way violate the "Principles of Ethics" by so advertising my tonic? I am enclosing one of my sample labels and would like for you to tell me if there is anything wrong as far as ethics are concerned. If there is, would it be all right for me to drop the Doctor and manufacture it under the name of ——— Corporation?

D.D.S., Louisiana

Reply • The answer to both your questions is found in Section 16 of the "Principles of Ethics" of the American Dental Association. This reads as follows:

Use of Professional Titles and Degrees • A dentist may use the usual titles or degrees (Doctor, Dentist, D.D.S. or D.M.D.) in connection with his name on cards, letterheads, office signs and announcements, but he may not so use his title or degree in connection with the promotion of any drug, agent, instrument or appliance.

Chairman, Judicial Council

Cases and Comments

AN EVALUATION OF THE DENTAL IDENTIFICATION RECORD: REPORT OF A CASE

By Ralph B. Nash, Capt. USAF (DC) and David S. Augenblick, Capt. USAF (DC), San Angelo, Tex.

Both in our Armed Forces and in civilian life, the problem arises of identifying accident and combat victims. This matter is being brought into sharper focus with the current expansion of our Armed Forces, since fatalities occur in the training of men even under rigorous safety measures. Death often comes to military personnel in a violent manner, mutilating the body beyond recognition. Such means of recognition as identification tags, fingerprints, bracelets, rings, cards and superficial markings are often lost or destroyed. The teeth, on the other hand, generally are not mutilated and may be relied on as a means of identification.

A dental identification method has been in use by the U. S. Air Force for some time. A Dental Identification Record (D.I.R.), which is prepared routinely on all flying personnel, includes the location and description of restorations and prostheses as well as notation of all missing teeth and abnormalities. The detailed picture is kept current while the D.I.R. is on file in the station dental clinic, since additions are entered on the chart. This history becomes a portion of the airman's permanent file, as it is transferred with him when he leaves for a change in station.

With properly trained auxiliary personnel, the tediousness of the time consuming task of recording and filing this data can be overcome. Although occasions for its use are infrequent, such data are invaluable when the information is the sole means of absolute recognition.

A graphic example of the value of the D.I.R. occurred following the crash of a training plane on a routine flight at Goodfellow Air Force Base in March 1951. Although the names of both casualties were known, no identification tags were found attached to the charred and mutilated bodies. After the bodies were removed to a local funeral parlor, identification was sought by the flight surgeon. The presence of a gold wedding band without initials, and the knowledge that one of the casualties was married, tentatively established his identity. However, to avoid any possible error in identification by relying on such presumptive evidence, as in the case reported by Rosen and Adlington,[1] the bodies were not tagged until they were examined by the dental officers.

Although the facial features of one victim were charred beyond recognition, the teeth were intact in the dental arch. This body was easily identified since L-3 was missing and the space had closed. In the other casualty, the force of the crash had completely eradicated all facial features and left only the left maxilla, the mandible having been completely scattered. The body was identified by the process of elimination. Identity of these men was established beyond any possible doubt.

To facilitate examination of the teeth under such conditions, the usual mirror and explorer method is not usually feasible. The use of selected instruments is of aid at the time of the postmortem examination. It is suggested that the following instruments be included in an "Identification Bag" for this purpose: 2 by 2 inch gauze, a solvent such as chloroform or xylol, rubber gloves, scissors, tissue forceps, hemostat, tongue blades, heavy chisel, mallet, flashlight, mouth prop, explorer and mirror, and a suitable container or carrying bag.

Much was learned by this experience. The need for accurate dental identification records and the availability of such records is of prime importance, as is the need for specific instruments to facilitate examination in these cases. The problem of identifying combat and accident victims becomes relatively less complex with the use of the D.I.R. method used by the Air Force.

Goodfellow Air Force Base

1. Adlington, J. A., and Rosen, J. G. Identification by dental records, Supplement Army Medical Bulletin, The Dental Bulletin, 11:103 (July) 1940.

MULTIPLE IMPACTIONS OF PERMANENT BICUSPIDS AND DECIDUOUS MOLARS

By David J. Kennedy, D.D.S., Syracuse, N.Y.

On September 16, 1949, a 21 year old woman was referred to this office for removal of an impacted maxillary right second bicuspid which, she complained, was causing some pain.

Examination disclosed a small gingival open-

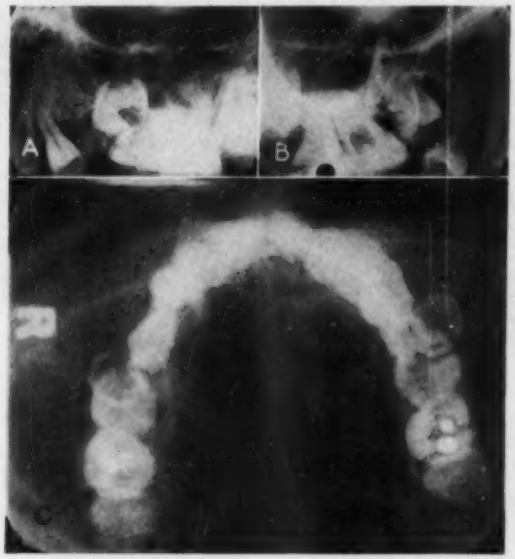


Fig. 1 • Maxillary right (A) and left (B) bicuspid areas, showing impacted unerupted tooth on each side, each associated with a supernumerary tooth. Occlusal film (C) shows buccal position of supernumerary teeth and accentuates decalcification

Fig. 2 • Deeply impacted permanent tooth in left mandible, associated with calcified object superior to it

Fig. 3 • Postoperative views of maxillary right (A) and left (B) bicuspid areas

ing exposing the lingual cusp which was carious. The maxillary and mandibular left second bicuspids were not present in the erupted dentition. The case presented an orthodontic problem because of almost complete lack of occlusion in the molar and bicuspid regions.

Full mouth roentgenograms revealed that the three unerupted teeth were impacted and that each was associated with what appeared to be a supernumerary molar in which there was decalcification. In the maxilla (Fig. 1) the supernumerary teeth were superior to the bicuspids and bordered on the antrum. An occlusal film (Fig. 1C) disclosed the supernumerary teeth to be positioned buccally and accentuated the decalcification. In the left mandible (Fig. 2) the permanent tooth was deeply impacted and the associated calcified object was superior to it.

On September 19, 1949, the right side was opened with a buccal flap, under local anesthesia. The supernumerary tooth, which was removed without difficulty, occupied a position on the antral wall. Its removal disclosed the underlying antral mucosa which fortunately was not perforated. The extreme curvature of the impacted bicuspid root made removal of this tooth difficult. The flap was sutured back into place. Postoperative roentgenogram is shown in Figure 3A.

The supernumerary tooth showed the anatomical configuration of a deciduous molar. The roots were almost completely resorbed.

A carious area was observed on the occlusal surface.

On October 1, 1949, the left maxillary bicuspid area was opened. The bicuspid was removed with little difficulty. A large follicular sac enveloped the crown. Postoperative roentgenogram is shown in Figure 3B.

As on the right side, the supernumerary tooth occupied a seat on the antral wall. This tooth was so decalcified that it crumbled almost completely during removal. Again there was no perforation of the antral mucosa. On this and the previous occasion, the postoperative course was normal.

The lower teeth were not removed because of the patient's school schedule.

It was not possible to determine whether the impacted deciduous teeth were missing from the deciduous dentition or were supernumerary deciduous molars. It is likely that they were missing and that the resulting forward movement of the permanent first molars prevented eruption of the bicuspids.

415 Wilson Building

ABERRANT SUPERNUMERARY MAXILLARY MOLAR

By C. W. Newman, D.D.S., chief, dental service, Veterans Administration Hospital, Indianapolis.

A 21 year old white man was admitted to the hospital on February 25, 1948, with the complaint of toothache for the past three days and a swollen lower right jaw for one day. The patient stated that he had lost about 60 pounds since giving a blood transfusion in September 1947. The swollen area of the jaw was tender and indurated, but there was no definite fluctuation. Temperature was 101.2° F.

Roentgenograms showed an impacted lower right third molar and an aberrant upper right first molar (illustration, A).

On March 2, 1948, the impacted third molar was removed surgically. Eight days later the socket and surrounding soft tissues had recovered sufficiently to permit the removal of the upper aberrant tooth as a prophylactic measure against possible cystic development from the dental follicle, as well as extensive bone loss in this location. Under local anesthesia, an incision was made in the right palate from the second molar to the lateral incisor. The soft tissue was retracted, exposing a slight bulge in the palate medial to the first bicuspid. With an automatic chisel, enough of the bone was removed to permit the removal of the tooth in its entirety. After débridement of the wound, the edges of the bone were smoothed with rongeur and bone file. After irrigation, four sulfathiazole cones were placed in the cavity, and the gum was sutured securely in place with no. 000 plain catgut. Postoperative roentgenogram is shown in the illustration, B.

Codeine was used for postoperative sedation. On the day following the operation, the patient started using normal saline mouthwash and continued until discharge. Recovery was uneventful and the patient was discharged from the hospital on March 15, 1948. He returned on June 1, 1948, for a check-up and roentgenograms (illustration, C) were taken which showed normal healing to be almost complete. There were no residuals in the mouth and the palate was bilaterally symmetrical.

The radiolucent area around the crown of the aberrant tooth, representing the tooth follicle, could possibly have grown in size to become a follicular cyst and cause the loss of adjacent normal teeth. Because of the palatal approach the remaining teeth were not disturbed and there is no evidence that they will show damage from the presence in the past, of an aberrant tooth.

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Sponsored by the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the author are a result of his own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

Roentgenograms before and after surgical removal of an aberrant right first molar. A, on February 25; B, on March 2 after surgical removal; C, on June 1, 1948, when healing was almost complete

SPONTANEOUS HEALING OF PERIODONTAL ABSCESS: REPORT OF A CASE

By William A. Peterson, D.D.S., M.S.D., clinical assistant professor, division of periodontia, University of Minnesota, Minneapolis.

The periodontal abscess is defined by Miller[1] as "a localized accumulation of pus situated in the supporting structures of a vital or nonvital tooth." These abscesses usually form in periodontal pockets or between the roots of multirooted teeth. Traumatic occlusion is frequently the initiating factor.

The abscess may drain directly into the periodontal pocket, but lack of drainage will cause it to seek another outlet and result in a direct fistula through the gingival tissues.

The local symptoms are general swelling of the involved gingiva, with varying degrees of pain. The tooth usually is not sensitive to percussion, although the gingival tissues may be painful when touched. The pulp of the involved tooth will respond normally to vitality tests as pulp vitality is not a factor in the development of periodontal abscesses.

The treatment advocated for periodontal abscess by Goldman[2] is establishment of drainage followed by hot saline washes until the acute symptoms have subsided. A flap operation of the Sorrin type is performed to allow curettage of the involved areas.

In the case reported here, complete healing took place with no treatment other than the establishment of drainage. The patient, a 23 year old white man, in good health but with an extreme overbite, came to this office on February 21, 1949, with the complaint of tenderness and looseness of the upper left central incisor. Clinical examination showed a well defined inflammatory lesion, approximately 2 by 3 mm. in size, on the gingiva slightly distal to the upper left central incisor. All teeth in the area gave normal responses to a unipolar electric pulp tester. Roentgenograms showed an oval radiolucent shadow between the upper left central and lateral incisors. This shadow did not involve the apices or bony crest, but did obliterate the periodontal lamellae on the upper left lateral incisor (illustration). The abscess was opened with a sterile explorer and pus drained intermittently for three days. When the patient was seen again on March 1, 1949, no pathosis was apparent. On May 6, 1949, a 4 mm. pocket was found on the lingual aspect of the upper left lateral incisor. No treatment was instituted other than establishing drainage on February 21. Successive roentgenograms showed a remineralization of the affected area until, on February 9, 1950 (Illustration) no evidence whatsoever of radiolucency could be observed. Continued roentgenographic and clinical examination has shown no evidence of recurrence.

1447 Medical Arts Building

1. Miller, S. C. Textbook of periodontia, ed. 3. Philadelphia, The Blakiston Company, 1950.

2. Goldman, H. M. Periodontia, ed. 2. St. Louis, The C. V. Mosby Company, 1950.

2-21-49 *4-8-49* *2-9-50*

LON W. MORREY, D.D.S., EDITOR

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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Editorials

Plans completed for Association's ninety-second annual session

The ninety-second annual session of the Association will he held in Washington, D. C., October 15-18. Members who have not yet made hotel reservations are urged to do so now, as early reports from the Housing Bureau indicate a heavy attendance. The Council on Scientific Session, of which William A. Garrett of Atlanta is chairman, has achieved a solid objective in the preparation of this year's scientific program, which will be presented in the District's modern National Guard Armory. The House of Delegates and the Board of Trustees will conduct the business affairs of the Association at the Statler Hotel. Both the Statler and the Mayflower have been designated as official hotels, although 34 of the leading hotels in the nation's capital are cooperating with the Association in order to accommodate an estimated attendance of 15,000.

For the first time in the history of the Association, color television will be used to enhance the program of the scientific session. Televised programs of surgical and other operative procedures, originating at the Mount Alto Veterans Administration Hospital, will be presented over ten receiving sets installed in the National Guard Armory. This latest adjunct to scientific education provides a method heretofore impossible by which large audiences of dentists may obtain an intimate view of intricate operations. The complete three-day program of morning and afternoon telecasts will be published in the September (preconvention) issue of the THE JOURNAL.

In addition to the television presentations, the scientific program will consist of 80 essays scheduled for the 11 scientific sections, 200 table clinics, 50 scientific exhibits and a continuous showing of the latest and best dental motion pictures.

Approximately 200 booths of technical exhibits covering over 25,000 square feet of floor space also will be on display at the Armory.

Members of the House of Delegates are forced to miss many of the benefits of the scientific program and this is unfortunate. However, the business affairs of the Association have grown so great and complex that they require almost the full time and attention of most members of the legislative body while at the meeting—a heavy price paid graciously by those interested in strengthening the Association, elevating the profession, and improving the dental health of the public.

It has been 22 years since the Association last met in Washington, D. C. During the interim the capital of the country has grown to such size and importance that it might almost be called the capital of the world. Its many new architectural masterpieces, art galleries and museums, plus its proximity to famous historical sites, make it an ideal convention city. Certainly the setting for this year's session will furnish conventioners, their families and guests with an education unequalled elsewhere in this country. If you have not made your hotel reservations turn to page A-51 of this issue of THE JOURNAL, and fill in, tear out and mail a reservation request for yourself and your family, every member of whom will enjoy and profit from this year's session of the Association.

And now dilution: Great Britain to train dental nurses

Britain, it is reported from London in a recent issue of the *Daily Mail,* proposes to incorporate in its National Health Service a system similar to the dental nurses' program of New Zealand. Ministry of Health officials, in consultation with some members of the dental profession, now are drafting legislation which will permit the training of young women to extract and fill teeth for children. After completing a two year course of training, these auxiliaries will work in school dental clinics, replacing dental officers who are leaving the school dental service because of inadequate income.

To those who have watched with concern the mounting difficulties of dentistry under the National Health Service program, it is apparent that history is repeating itself. The rocky road now being traversed by the dental profession in Britain follows closely the descending path trod earlier by dentists in Bismarck's German Krankenkassen.

The pattern of a national compulsory health insurance program never changes. Preceded by grandiose political promises, the system imposes special taxes on the public for which the gullible expect, but rarely receive, special services. It imposes special regulations and restrictions on the practitioner which tend to lower the quality of service and the national standards of dental health. Lastly and inevitably, in order to cut costs and make good on their grandiose promises, the politicos further dilute the standards of service by injecting partially trained auxiliaries into the ranks of the profession.

In Germany, as a result of Bismarck's compulsory health insurance program, auxiliaries trained as mechanical dentists restore missing teeth for adults by means of prosthetic appliances. Under the proposed plan in Britain, auxiliaries will be trained to extract and fill teeth for children.

As Roy G. Ellis points out in his recent report to the Canadian Dental Association on the dental health services in New Zealand and Australia, "the dental profession in New Zealand is at this very moment reacting violently to the increasing pressure of the dental prosthetic technicians for recognition. The politician poses an embarrassing question when he asks, 'If operative technicians are acceptable for children, why not prosthetic technicians for adults?' "

Despite knowledge of the difficulties now facing New Zealand, and the problems which have faced Germany for more than half a century and which that country now is attempting to solve, Britain apparently is determined to embark on a scheme of substandard service rather than to launch a program of dental research and prevention which, under the careful direction of well known British scientists, would eventually reduce the prevalence of dental disease.

Children, candy and caries

Enough candy was consumed in the United States, during the last year, to allow an average of one and a half pounds a month to every man, woman and child. This statement was made, according to newspaper accounts, at a recent convention of the National Confectioners' Association in Chicago. According to the statistics presented, the consumption of candy in this country has risen nearly 5 per cent for 1949 to 1950. The incidence of dental caries also has risen. Although no annual figures are available, the amount of dental decay among representative groups of young people increased approximately 7 per cent from 1929 to 1939, and an equal amount from 1939 to 1949.[1]

The confectioners doubtless view with satisfaction their increasing sales and may find it difficult to understand why the dental profession is not equally gratified with the growing need of fillings, extractions, and dentures. The dentists' efforts to stem the swelling tide of dental disease by control measures such as the use of fluorides, ammonia compounds, penicillin and other preventive drugs, as well as by effectively timed toothbrushing, may appear to the commercial eye a bit incongruous; and for the same reason, to the confectioner the profession's aim to reduce the use of sugar products by American youth seems unjustifiable and perhaps unrealistic.

It is not unnatural that candy makers should promote the sales of their product; but some products—and surely candy is one of these—do not require or merit special encouragement in order that they should obtain a fair patronage. Children—and adults as well—are all too ready to indulge in the pleasures of ambrosial sweets, without special inducements. Whether inadvertently or through ignorance, some of the agencies which should promote the welfare of youth may find themselves granting sanction to forces destructive to health, unless they are alert to this danger.

The dentist who thoughtlessly rewards his child patient for good behavior with an attractive lollipop provided by the manufacturer at a bargain price is unwittingly contributing, not only directly to the deterioration of his young patient's teeth, but by tacit approval, to the strengthening of the sugar interests' contention that sweets are not conducive to dental decay.

The methods of commercial enterprises are sometimes direct, sometimes more subtle. The National Confectioners' Association, about two years ago, prepared a "teaching kit on candy" which, they hoped, would find its way into classes on nutrition and diet in schools. The Inter-Agency Nutrition Planning Committee[2] refused its approval. Although recognizing that the kit presented candies nutritionally superior to many on the market, the Committee rightfully asserted:

> However, these teaching materials were prepared for the obvious purpose of increasing the interest in and the consumption of candy. The inter-agency committee on nutrition planning believes that such a result would impair the nutritional quality of children's diets many of which are already in need of improvement. . . .

The philanthropic contributions of commercial houses, even if actually well-intentioned, are sometimes equivocal and objectionable. In a recent local campaign for funds for the Boy Scouts, a candy manufacturer who styled himself "a friend of scouting" donated boxes of candy which contained 35 cents' worth of candy to be sold by the scouts for 30 cents. Although the motive for this philanthropy may have been disinterested and commendable, the propriety of raising money by this method may well be called into question. There are many other articles for promotion and sale which would be more in keeping with the aims of an organization devoted to the welfare and upbuilding of American youth. A similar criticism might be made of the sale of sticky cookies by the Girl Scouts to raise money. The adults who have sponsored these projects have doubtless been unaware of the health implications of sugar, and of the persistent efforts which the dental profession is making to save the teeth and the health of the nation's young people.

Incidentally, when a new edition of the Boy Scouts' manual, *Handbook for Boys*, is planned, the dentist would no doubt like to suggest a revision of the sections on Health, especially Care of the Teeth, to warn the scout of the dangers of overindulgence in sweets.

1. Brekhus, Peter J. The deterioration of human teeth. J.A.D.A. 42:424 (April) 1951.
2. J. Michigan D. Soc. 31:100 (June) 1949.

Washington News Letter

Congressional activity on health and dental matters, sidetracked for consideration of international and mobilization legislation, is expected to be resumed in the near future. With the return to Washington in mid-July of Sen. James E. Murray, chairman of the Senate Labor and Public Welfare Committee, action is anticipated on Federal aid to dental and medical schools and possibly the bill for establishment of a department of health, as well as a number of lesser measures.

There is at least an even chance that some members of the committee will work for enactment of legislation to strengthen professional control of the Department of Medicine and Surgery in Veterans Administration, implementing recommendations made in July by the Humphrey investigating committee.

One of the charges which Veterans Administrator Carl R. Gray, Jr., was called upon to answer, in connection with the Senate investigation of administrative practices, concerned the purchase of 99 dental units when VA had 534 such units available in storage. Expenditure of $89,000 was protested by Bion R. East, chief of VA's dental service, to Paul B. Magnuson, then chief of Department of Medicine and Surgery. The latter indorsed the complaint and relayed it to Gray.

In his explanation to the Humphrey committee, Gray said the 99-unit, $89,000 contract had been entered into with the manufacturer (Weber) by the Army Engineers Corps in connection with the construction and equipment of 19 new hospitals. He noted chidingly that the medical and dental departments, at the time of the purchase (March 1948), were less concerned about overstocking of dental units than the fact that Army had purchased a make that was not the first choice.

"No question was raised," said Gray, "by the Department of Medicine and Surgery concerning the purchasing of unnecessary items in the light of the surplus materials at the supply depots."

CANCER TEACHING GRANTS

Federal Security Agency has approved the award of Federal grants, averaging slightly less than $5,000, to 16 dental schools (see page 237) for improvement of cancer teaching. All of the recipients had similar assistance last year. At its spring meeting, the National Dental Research Advisory Council approved grants totaling approximately $60,000, later increased to $72,657, as announced by Oscar R. Ewing July 13.

WAR DAMAGE AID

Public hearings are scheduled to be conducted by the Senate Banking and Currency Committee in August on a newly introduced bill for Federal aid to health and hospital facilities, including teaching institutions, that are damaged or destroyed as the result of enemy attack. The bill, which is supported by the White House and sponsored by Sen. J. Allen Frear, Jr., of Delaware, also provides for government payment for clinical services rendered for victims of enemy action in the United States.

FEDERAL DENTAL SERVICES

The Council on Federal Dental Services of the American Dental Association met in Washington July 15-17, collecting latest information on military and civilian governmental policies for presentation to the House of Delegates here in October. R. H. Friedrich, chairman, described it as a highly successful meeting that had full cooperation of top level leaders in Federal dental and other health programs.

Manpower problems received primary attention. Reports on officer procurement and utilization of professional and auxiliary personnel were presented by dental chiefs of Army, Navy and Air Force. Related factors, including operation of "doctor-draft" machinery, were discussed with representatives of Selective Service and the Health Resources Advisory Committee of the Office of Defense Mobilization.

Also on the agenda were the use of dental hygienists in military and civilian branches of the government; dental health implications of the proposed universal military training program; administrative questions confronting the Veterans Administration dental service, and sundry dental public health issues in the jurisdiction of U.S. Public Health Service.

VETERANS ADMINISTRATION

Operations of the dental service of Veterans Administration, Department of Medicine and Surgery, were scrutinized on July 16 at a meeting here of the advisory council to Bion

R. East, assistant chief medical director. At the same time, Irwin A. Conroe, of Altamont, N. Y., was installed as chairman of the council, succeeding Paul Jeserich.

Willis Krueger, of Dr. East's staff, reported on the series of courses in fundamentals of psychiatry which was launched early this summer at Topeka veterans hospital for dentists who perform services for mental patients.

The council also reviewed accomplishments of seven regional conferences held in May and June at Buffalo, St. Paul, Portland, Ore., San Francisco, Houston, Atlanta and Brooklyn, attended by approximately 200 professional people, principally chiefs of dental service at hospitals and centers. Clinical sessions were held in conjunction with discussions of administrative policies and procedures.

Reports were presented, in addition, on development of aseptic technics in tuberculosis hospitals for maximum protection of patients and dental personnel alike, and on plans for operating the new dental training center scheduled to be completed and go into commission in Chicago in October 1952.

Dr. East disclosed abolition of the dental auxiliary service division and reassignment of its responsibilities among other divisions under his supervision. At the same time, he announced establishment of a new division of field supervision, with Joseph Mona as chief.

CIVIL DEFENSE

In another area of Federal dental activity, Russell W. Bunting assumed his new duties in July as consultant to Federal Civil Defense Administration on problems involving dental services and personnel. He stated that he plans to work closely with the American Dental Association in the drafting of a pattern for efficient utilization of the country's practicing dentists in civil defense measures.

International Correspondence

NEWS FROM GREAT BRITAIN

Dentistry in Britain is a closed profession. No one is permitted to practice it unless enrolled in the current Dentists' Register. There is one exception and that is that medical registration entitles a physician to practice dentistry as a branch of medicine. The Dentists' Register is kept by the Dental Board of the United Kingdom.

DENTAL BOARD OF THE UNITED KINGDOM

Registration with the Dental Board is an annual obligation for all who wish to practice and who were first registered after 1921. Those who were on the Dentists' Register before the passing of the Dentists' Act in 1921 remain on the Register without further fee, but all others must pay the annual registration fee of two guineas.

The chairman of the Dental Board is appointed by the Government. The Board is composed of representatives of the Government, representatives of the General Medical Council and representatives of the dental profession. The last are elected by the sections of the profession which they represent. Everyone on the current Register has a vote; balloting is by mail. The qualified practitioners in England and Wales elect two representatives, and the qualified practitioners in Scotland and Northern Ireland elect one each. The practitioners registered under the 1921 Act elect two of their number to the Board.

Moves are afoot to present a Bill to Parliament which it is hoped will become a new Dentists' Act. Preliminary discussions have already taken place and it is hoped that the Bill will be introduced soon. Among the changes envisaged is the creation of a Dental Council with much greater powers and wider responsibilities than the present Board has. This proposed Council would replace the Board.

Dental Manpower • At the last meeting the chairman, E. W. Fish, said that in 1926 there were just under 14,200 names on the Register and in that year it was estimated that an annual intake of students to the dental schools in Britain should not be less than 700 if the profession was to be able to treat in the future all those who would require treatment as a result of the wider understanding of its importance. In the 18 years which followed this

estimate, the average entry was 313 and the maximum 418. At the end of that period, in 1944, there were 14,438 names on the Register. In that year the Teviot Committee was meeting and a Government actuary estimated that an annual entry of 800 students was necessary to provide in 20 years the 20,000 dentists required to ensure adequate dental treatment for the population of the whole country. In 1946 the total student entry to the dental schools in Britain was 641. Two years later it was 662 and in 1950 it had fallen to 606.

At present all the dental schools are overcrowded and it appears that very little can be done in the near future to increase the accommodation. Sheffield, Dundee and Edinburgh are increasing the accommodation by big building schemes, but this will not affect the numbers very greatly. New schools are expected to be built at Cardiff and Aberdeen, but they are only at the planning stage.

Dr. Fish stated that the present number of names on the Register is 15,327 and the estimate for ten years hence is 16,850. This figure indicated that little hope can be entertained that the 20,000 mark will be reached in 1964. In 1946 an analysis of the figures showed that there were 327 graduates, 9,972 licentiates, 54 practitioners registered as being in practice in 1878, and 4,672 registered under the Act of 1921. There were also 241 registered on qualifications obtained abroad. At present 646 are graduates, 10,390 licentiates, 11 registered under the Act of 1878, 3,996 registered under the 1921 Act and 479 have qualifications obtained abroad.

The Board and Dental Education and Research • The Board has continued to help dental education and research, and was responsible for the successful conference in 1947 on postgraduate education. There has also been established a most helpful bureau which has information on all postgraduate courses of interest to dentists and has been much appreciated by overseas students.

Dental health education for the general public fell to a low ebb during the war and for a few years after it. During the last year or two, however, there has been renewed activity in this sphere of public health education, including production of new posters, leaflets, colored charts to aid chairside instruction in oral hygiene, film strips to help lecturers on oral health, a booklet on oral hygiene for the use of teachers; and a film which is being prepared to help in this education campaign of the Board and which promises to be extremely good. Education of dental students is also in the Board's program and a committee has been formed to survey the field of visual aids. About 100 dental films have been assessed and so far the Board has made copies of 13 of them. These are available to dental schools, postgraduate groups and dental societies. A further 27 films are to be added in the near future. The films will form the nucleus of what it is hoped will grow into a first-class film library.

Disciplinary Function of the Board • The Board has a disciplinary function to exercise over the profession. During the past five years the number of disciplinary cases has fallen. According to Dr. Fish, during the period 1934-1939 83 cases were heard and 38 names were removed from the Register; i.e., 38 people could not practice dentistry. In the period 1946-1951, 45 cases were heard and 12 names were removed. During this period the Board prosecuted a number of people for unregistered practice of dentistry. Fifty-nine convictions were obtained, or one third of the number in 1934-1939.

CHARGES FOR DENTURES

As to the effect the introduction of a scale of charges for dentures has had on the general dental practitioner, a true assessment cannot yet be made. We are in the holiday season and there has always been a falling off of the number of patients seeking treatment about this time. Some practitioners who did a lot of extractions and making of dentures have noticed a reduction in new patients. One or two have told me that they have not had a new patient coming for dentures since the fees were introduced. There seems to be a noticeable effect on the dental mechanics, who will be the first to feel the effects of the charges. One practitioner, who at one time had experienced some difficulty in getting his mechanical work done, told me that within a period of ten days five mechanics came and offered him their services.

Another indication that there is perhaps a falling off in the patients is the fact that several practitioners, who sought recent graduates to undertake *locum* appointments with them while they went on holiday this year, are closing down their practices during the holiday period.

These are, however, only small pointers and many practitioners are not prepared to state that there is much change. Those practitioners whose work was largely conservative have not noticed any great change either. It is too early to assess the situation but there are straws in the wind.

John Boyes

WASHINGTON'S EXCELLENT HOTEL FACILITIES PROMISE NO CROWDING AT 92d ANNUAL SESSION: 15,000 ATTENDANCE ANTICIPATED

With an attendance of 15,000 expected at the ninety-second annual session of the Association, to be held in the nation's capital October 15-18, the general chairman of the local arrangements committee, David J. Fitzgibbon, has reported that there is every indication that this year's meeting will be the most successful in the history of dentistry.

The Housing Bureau has reported that plenty of rooms are still available at the 34 Washington hotels which have pledged accommodation, and has urged that members send in their requests for reservations as early as possible to avoid the last minute rush. A convenient form for this purpose, together with a map of the city showing the location of the hotels, appears on page A-51. The Statler and the Mayflower are the official hotels. The Board of Trustees and the House of Delegates will meet at the Statler.

Color television programs on ten receiving sets will allow 400 persons at a time an over-the-shoulder view of dental operations, performed at the Mount Alto Veterans Administration Hospital six miles away. The 11 scientific sections will present 80 essays, 200 table clinics, and 50 scientific exhibits; and a number of new dental motion pictures, in premiere showings, will be presented in a continuous program. In addition, over 25,000 square feet of floor space in the National Guard Armory will be devoted to approximately 200 booths of technical exhibitors.

FLUORIDATION

Fluoridation problems will be given a thorough analysis during the meetings, with emphasis on a study of mottled enamel by Frederick S. McKay of Colorado Springs, and reports from a chemist, a practicing dentist, and a public health dentist, by A. P. Black of Gainesville, Fla., Milton E. Nicholson of Pittsburgh, and F. A. Bull of Madison, Wis., respectively.

DENTAL HEALTH CONFERENCE

In addition, problems encountered in getting acceptance of fluoridation by community officials, and some of the technical problems that need to be solved before fluoridation can be started, will be threshed out at the second annual conference of state councils on dental health and state dental directors, to be held October 13 at the Hotel Statler—two days before the official opening of the meeting by Harold W. Oppice, president. The meeting, sponsored by the Council on Dental Health, will be open to members of the Association, it is reported by Allen O. Gruebbel, secretary of the Council.

OTHER HIGHLIGHTS

Among other highlights of the scientific essay program is a symposium on direct resinous filling materials, moderated by George C. Paffenbarger, the Association's research fellow at the National Bureau of Standards, where he is in charge of the dental laboratory. Participating in the symposium will be George Brauer of Washington, D.C., J. F. Volker of Birmingham, Ala., Irl C. Schoonover of Washington, D.C., Ralph W. Phillips of Indianapolis, Herbert D. Coy of Richmond, Va., Robert B. Wolcott of Bethesda, Md., Alexander Seelig of New York, and Isaac Schour of Chicago.

The complete program, in preliminary form, will be published in the September issue of THE JOURNAL and will include the social events and the program arranged by the Committee on Ladies' Entertainment, chairman of which is Mrs. Lawrence Smallwood.

NATIONAL DENTAL MUSEUM

The National Dental Museum, official museum of the dental profession since the thirty-fifth annual session of the Association in 1895, has invited Association members and their families to inspect its exhibits, located at the Armed Forces Institute of Pathology. Col. Joseph L. Bernier, executive secretary and pathologist at the Registry of Oral Pathology and chief of the dental and oral pathology section of the Armed Forces Institute, states that "a splendid collection of gross and microscopic material" is on display, as well as "casts, instruments and appliances, and other material demonstrating the development of dentistry." He suggests that gaps in the collection might well be filled by museum specimens hidden away in the offices of dentists who are not aware of their historical value, or who have known of no place to deposit them.

Association Affairs

CONSULTANTS AGREE ON STATE DENTAL HEALTH UNIT PROBLEM

Seven public health experts, in conference with the Council on Dental Health of the Association and an administration consultant, on July 13, concluded that the dental unit should have equal administrative status with other major divisions of the state health department, in order to discharge effectively its responsibilities in dental public health matters, according to Allen O. Gruebbel, secretary of the Council.

The group expressed the view that as a means of achieving the objective, the dental profession should be represented on advisory committees when surveys are made within the states for the purpose of reorganizing the administrative pattern of the health department.

Consensus of the group was that the dental director should have direct access to the state health officer on all dental matters, and should have the opportunity to participate in staff meetings of heads of the divisions of the state health department. His salary should be on a par with that of the directors of other major divisions, and properly qualified public health dentists should be eligible for appointment to the high echelon positions. In each state there should be a dental advisory committee to the state health department, composed of members of the dental profession and the lay public, the group believed.

Consultants at the one-day meeting, held during the July meeting of the Council, were F. A. Bull of Madison, Wisconsin state dental director; Paul E. Fox of Washington, D. C., public health adviser to U. S. Public Health Service; Roscoe P. Kandle of New York, USPHS field director; John W. Knutson of Washington, chief of the Division of Dental Public Health, USPHS; Edward G. McGavran of Chapel Hill, N. C., dean of the University of North Carolina school of public health; John D. Porterfield of Columbus, Ohio state director of health and secretary of the Association of State and Territorial Health Officers; and Harold L. Wylie of Chicago, professor of management, Northwestern University school of commerce.

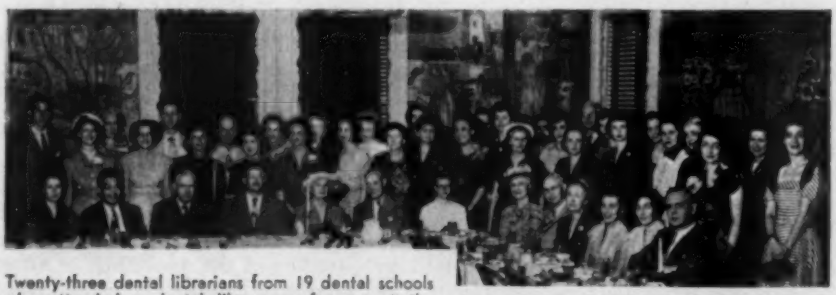
Meeting of the Council on Dental Health • Among matters discussed at the three-day meeting of the Council were the inclusion of dental operations in Blue Shield plans, and the integration of school dental inspection programs with over-all programs of dental and general health, Doctor Gruebbel has reported.

COUNCIL APPROVES DENTAL HYGIENE CURRICULUM OUTLINE

The Council on Dental Education of the Association has approved the recommendations regarding curriculum and course content of dental hygiene schools, made by dental hygiene directors at a workshop conference June 18-20. The minimum basic curriculum recommended will be used by inspection committees as a yardstick in their evaluation of dental hygiene school programs, in the accreditation program soon to be inaugurated, it is reported by Shailer A. Peterson, secretary of the Council. The Council's action was taken at a meeting July 7-8 in the Central Office.

The recommendations stated that the dental hygiene curriculum should include a total of 1,850 clock hours, of which at least 600 should be in the basic sciences, 700 in the clinical sciences, 350 in such courses as English, sociology and psychology, and 200 in electives. The Council's requirement for the two-year program is 1,600 to 2,000 clock hours. At the same time, the Council approved the following clock hour figures which the dental hygiene directors recommended as "absolute minimums" for each subject in the first three categories:

Courses	Absolute minimum clock hours
Basic Sciences	
Pathology	32
Anatomy	55
Physiology	30
Histology	48
Dental anatomy	96
Chemistry	60
Pharmacology	16
Bacteriology	72
Nutrition	24
Clinical Sciences	
Clinical dental hygiene	496
Cultural and Miscellaneous	
First aid	16
Hygiene	16
Dental health education	32
Public health	24
Sociology	32
Psychology	32
Ethics, economics, jurisprudence, and office procedure	16
Speech	30
English	64



Twenty-three dental librarians from 19 dental schools who attended a dental library conference at the Central Office on June 25 are shown here, at their closing banquet, with members of the Advisory Committee to the Bureau of Library and Indexing Service, which sponsored the meeting, and members of the Central Office staff. S. I. Hayakawa, author of "Language in Thought and Action," was guest speaker.

The workshop conference, at which 24 of the 26 dental hygiene schools were represented, was sponsored by the Council on Dental Education and its Committee on the Training of Dental Hygienists.

Dental School Accreditations • In another action the Council gave full approval to the four year program of the Creighton University School of Dentistry, Omaha, Neb., and the three year program of the University of Alabama School of Dentistry, Birmingham.

Dental Laboratory Technicians' Program • The dental laboratory technicians' program of the University of California Extension Division, Los Angeles, also was approved.

Hospital Internship and Residency Approvals • The Council gave approval to four hospital internship and residency programs. They were the internship and residency in oral surgery at Mt. Sinai Hospital of Cleveland, and the rotating internships at the U.S. Marine Hospital, Staten Island; the U.S. Naval Hospital, Portsmouth, Va.; and the U.S. Marine Hospital, Norfolk, Va.

BOOKLET ON 1950 SURVEY OF DENTAL PROFESSION AVAILABLE

The report of the 1950 survey of the dental profession, made by the Bureau of Economic Research and Statistics of the Association, is available in booklet form on request from the Central Office, B. Duane Moen, director of the Bureau, has announced. Material in the booklet is reprinted from the August 1950-April 1951 issues of THE JOURNAL, in which the report appeared in serial form.

Requests should be addressed to the Order Department, American Dental Association, 222 East Superior Street, Chicago 11.

FOUR NEW DENTAL HEALTH BOOKLETS ARE AVAILABLE

Four new dental health education publications have been completed by the Council on Dental Health of the Association and are available on order from the Central Office.

A leaflet entitled *Toothbrushing* describes the reasons for toothbrushing, a technic and the cleansing aids. Another leaflet, entitled *Fluoride: Less Tooth Decay,* provides information on both the fluoridation of water supplies and the topical application of sodium fluoride.

A booklet entitled *Diet and Dental Health* contains nine pages of text describing how good dietary habits aid in preserving dental health. Another booklet, *The Maintown Dental Health Project,* is designed as a guide for civic groups and dental societies in the promotion of community dental health programs.

Requests for the publications should be marked for the attention of the Order Department. There is a nominal charge for quantity orders.

Other publications in preparation include a comic book with a dental slant, entitled *The Amazing Adventures of Daredevil Davey,* and a poster for publicizing Children's Dental Health Day which will be distributed by September 1, it is reported by Allen O. Gruebbel, secretary of the Council.

ASSOCIATION OFFERS TO ASSIST UMT COMMISSION

The Association has offered its assistance to the National Security Training Commission in matters relating to the dental health of members of the projected National Security Training Corps. The five-man commission is required to include measures for health protection of Corps members in its plans for a universal military training and service program.

In a letter to the Commission, Harold Hillenbrand, secretary, pointed out that

Members of the Association's mission to Japan were photographed on June 30 in Seattle, by International News Service, before boarding the train to Vancouver. Left to right are Harold W. Oppice of Chicago, president; LeRoy M. Ennis of Philadelphia, president-elect; Stanley D. Tylman of Chicago, chairman of the Council on International Relations; George C. Paffenbarger of Washington, research associate at the National Bureau of Standards; and R. C. Dalgleish of Salt Lake City, trustee from the Thirteenth District. On arriving at Vancouver, the group traveled to Tokyo by a Canadian Pacific plane via Anchorage, Alaska, and the Aleutian Islands.

Insert shows Dr. Oppice and Dr. Ennis being welcomed by Fred S. Shandley of Seattle, Eleventh District trustee, and E. W. Lambert of Salt Lake City, on their arrival at the Olympic Hotel for the Eighth Pacific Coast Dental Conference in Seattle on June 25.

in determining the amount and type of dental treatment to be provided in the Corps, it will be necessary to consider the problem in relation to available dental manpower, civilian dental needs, Government responsibility for future dental treatment of Corps members, and the low dental standards for acceptance into the Armed Forces. Reminding the Commission that dental disorders are almost universal, he said that "their presence in the prospective members of the National Security Training Corps will present a continuing challenge to the effective execution" of its mission.

In offering the Association's cooperation, Doctor Hillenbrand said that the problem is "peculiarly within the scope of the dental profession" and cannot be solved by physician administrators.

VOL. 42 INDEX FOR JOURNAL IS AVAILABLE ON REQUEST

The index for volume 42 of THE JOURNAL, covering the issues for the first six months of 1951, is ready for distribution. Requests for copies should be addressed to the Order Department, American Dental Association, 222 East Superior Street, Chicago 11.

Dental Societies

26 CONSTITUENT SOCIETIES EXCEED RELIEF FUND QUOTAS

Twenty-six constituent societies exceeded their quotas in contributions to the 1950-51 Relief Fund campaign, and brought the total collected by July 1 to $91,404.49, the closest figure ever attained to the $100,000 goal established by the Council on Relief.

Southern California led with a total of $9,442.25, or 214 per cent of its quota. Alabama came second with total contributions of $1,611.50 amounting to 207 per cent of its quota, followed by the District of Columbia with $1,364.48, or 168 per cent. Panama Canal Zone took fourth place with a quota figure of 163 per cent and total contributions of $49.00.

Other constituent societies whose dentists surpassed their quotas were Alaska, Arizona, Arkansas, Colorado, Georgia, Hawaii, Idaho, Kentucky, Mississippi, Montana, Nebraska, Nevada, New Jersey, New Mexico, North Carolina, North Dakota, Oklahoma, Oregon, Tennessee, Utah, Washington, and West Virginia.

Following is the complete tabulation of total contributions, announced by Leo W. Kremer, chairman of the Council on Relief:

Affiliate	Quota	Contribution	Per Cent
		$ 152.99	—
Air Force	$ 480	379.90	79
Alabama	780	1,611.50	207
Alaska	40	45.00	112
Arizona	280	299.50	107
Arkansas	480	582.15	121
Army	490	327.00	67
California	3,670	3,111.25	85
Southern California	4,420	9,442.25	214
Colorado	890	995.00	112
Connecticut	1,920	1,705.50	89
Delaware	160	102.00	64
District of Columbia	810	1,364.48	168
Florida	1,200	1,195.50	100
Georgia	990	1,533.95	155
Hawaii	370	394.00	106
Idaho	270	274.50	102
Illinois	7,570	6,262.32	83
Indiana	2,220	1,885.50	85
Iowa	1,800	1,526.50	85
Kansas	1,040	848.36	82
Kentucky	1,070	1,087.50	102
Louisiana	990	648.50	65
Maine	460	289.20	63
Maryland	1,040	1,033.77	99
Massachusetts	3,720	2,670.65	72
Michigan	3,830	3,193.50	83
Minnesota	2,990	2,457.90	82
Mississippi	530	569.10	107
Missouri	2,620	2,283.04	87

Montana	350	373.65	107
Navy	880	475.00	54
Nebraska	1,130	1,230.70	109
Nevada	90	106.50	118
New Hampshire	290	254.00	88
New Jersey	4,220	4,348.25	103
New Mexico	200	237.00	118
New York	15,590	10,755.65	69
North Carolina	1,220	1,450.00	119
North Dakota	330	451.55	137
Ohio	4,890	3,970.58	81
Oklahoma	910	1,279.50	141
Oregon	1,170	1,256.50	107
Panama Canal Zone	30	49.00	163
Pennsylvania	7,140	5,196.65	73
U. S. Public Health Service	250	134.00	54
Puerto Rico	270	105.00	39
Rhode Island	530	273.00	51
South Carolina	440	241.00	55
South Dakota	350	259.50	74
Tennessee	1,150	1,507.00	131
Texas	3,100	2,057.15	66
Utah	490	689.50	141
Vermont	190	111.50	59
Veterans Administration	1,040	367.00	35
Virginia	1,150	861.75	75
Washington	1,670	1,789.00	107
West Virginia	740	806.00	109
Wisconsin	2,890	1,869.50	65
Wyoming	170	145.00	85
Students	——	471.75	—
Miscellaneous	——	10.00	—
Total	$100,000	$91,404.49	91

ROSTER OF OFFICERS OF STATE DENTAL SOCIETIES

All but a few of the state dental societies had held annual meetings by July 15, and had installed new officers. The following is a roster of state dental society officers as of that date.

Alabama • J. L. Hughes of Albertville, president; Frank M. Mathews of Montgomery, president-elect; Levert G. Gravlee of Birmingham, vice-president; George W. Matthews of Birmingham, secretary-treasurer.

Alaska • Clayton L. Polley of Juneau, president; F. R. Sims of Palmer, vice-president; John H. Geyer of Juneau, secretary-treasurer.

Arizona • R. K. Trueblood of Glendale, president; E. J. Higgins of McNary, president-elect; H. G. DeWolf of Tucson, vice-president; E. M. Scott of Phoenix, secretary; W. H. Telford of Mesa, treasurer.

Arkansas • Roy Bucy of Rector, president; Paul M. Hardage of Arkadelphia, president-elect; Thermon B. Smith of Little Rock, vice-president; Don M. Hamm of Clarksville, secretary-treasurer.

California • Eldridge L. Hicok of Colusa, president; John B. Benediktson of Oakland, president-elect; Robert O. Schraft of San Francisco, vice-president; Lawrence R. Ludwigsen of San Francisco, secretary; Howard M. Johnston of Berkeley, treasurer; John G. Rooks of San Francisco, executive secretary.

Southern California • Melvin E. Ralston of Pomona, president; Walter J. Monia of Beverley Hills, president-elect; Jack S. Rounds of Los Angeles, vice-president; C. Albert Moss of Los Angeles, secretary; Lock Hales of Glendale, treasurer; James Robinson of Los Angeles, executive secretary.

Colorado • Ralph R. Gibson of Denver, president; Guy E. Jones of Grand Junction, president-elect; R. B. Tidwell of Denver, vice-president; Robert A. Downs of Denver, secretary; Wm. Roy Humphrey of Denver, treasurer.

Connecticut • Ira Dow Beebe of Bridgeport, president; Alan L. MacDonald of New London, president-elect; Philip M. Chernoff of Middletown, vice-president; Earle S. Arnold of West Hartford, secretary-treasurer.

Delaware • Joseph S. Mach of Seaford, president; John F. Maguire of Wilmington, first vice-president; Harry L. Kurfirst of Wilmington, second vice-president; S. J. Krygier of Dover, secretary; Louis Kreshtool of Wilmington, treasurer.

District of Columbia • John A. O'Keefe, president; Wm. Brown Ingersoll, president-elect; John F. Keaveny, vice-president; Karl H. Wood, secretary-treasurer; E. H. Steinberg, executive secretary.

Florida • John I. Todd of Jacksonville, president; W. G. McLeod of Pensacola, president-elect; L. M. Schulstad of Bradenton, first vice-president; Robert Thoburn of Daytona Beach, second vice-president; Thomas A. Price of Miami, secretary-treasurer; Virginia L. Kellogg of Orlando, executive secretary.

Georgia • J. R. Tucker of Atlanta, president; Frampton W. Farmer of Macon, president-elect; Irwin T. Hyatt of Atlanta, vice-president; J. M. Heard, Jr., of Macon, secretary-treasurer; Paul Conway of Macon, executive secretary.

Hawaii • John G. Knight of Honolulu, president; H. Nishimura of Hilo, president-elect; John H. Dawe of Honolulu, secretary; Roy A. Araujo of Honolulu, assistant secretary; Fred S. Kagihara of Honolulu, treasurer.

Idaho • Harry T. Phillips of Lewiston, president; Frank J. McAtee of Twin Falls, presi-

Secretaries of state dental societies, shown here with two staff members of the Association, participated in the fourth State Secretaries' Management Conference held at the Central Office June 11-13.

Standing (l. to r.) are Lon W. Morrey, editor, and L. M. Cruttenden, assistant secretary of the Association; Ray Cobaugh (executive secretary), Pennsylvania; F. A. Pierson, Nebraska; Paul W. Clopper, Illinois; Charles A. Wilkie, New York; Harold E. Tingley, Massachusetts; Kenneth F. Crane, Wisconsin; Julian S. Bernhard, Louisiana; T. T. McLean (executive secretary), Tennessee; Morris L. Biderman (recording secretary), Rhode Island; Fred Wertheimer, Michigan; Don M. Hamm, Arkansas; H. C. Gerber, Jr. (executive secretary), Michigan; John G. Rooks (executive secretary), California; Betty Satterfield (executive secretary), Missouri; H. M. Campbell, Mississippi.

Seated: E. E. Ewbank, Indiana; Mary Simpers (assistant to the secretary), Indiana; Earle S. Arnold, Connecticut; H. Leon Snow (executive secretary), Oklahoma; A. B. Drake, West Virginia; Virginia L. Kellogg (executive secretary), Florida; Wayne L. McCulley, Tennessee.

dent-elect; H. M. Klaaren of Lewiston, secretary; F. A. Hyke of Lewiston, treasurer; Allen R. Cutler of Boise, executive secretary.

Illinois • Walter J. Gonwa of Chrisman, president; Melford E. Zinser of Chicago, president-elect; George E. Thoma of Springfield, vice-president; Paul W. Clopper of Peoria, secretary; Werner J. Gresens of Oak Park, treasurer.

Indiana • Wilber P. McNulty of Fort Wayne, president; Frederick C. Baker of Hammond, president-elect; E. E. Ewbank of Kingman, secretary; Paul H. Asher of Gary, treasurer.

Iowa • Karl R. Hoffman of Algona, president; Floyd W. Pillars of Des Moines, president-elect; H. W. Stonebrook of Eldora, vice-president; Harry I. Wilson of Des Moines, secretary; R. D. Feldman of Ames, treasurer.

Kansas • Frank C. Carothers of Garnett, president; Otis B. Gentry of Girard, president-elect; F. A. Richmond of Kansas City, secretary; Stanley H. Flickinger of Baldwin City, treasurer.

Kentucky • Morris J. Wilson of Greenville, president; O. B. Coomer of Louisville, president-elect; C. D. Draper of Madisonville, vice-president; A. B. Coxwell of Louisville, secretary-treasurer.

Louisiana • L. F. Green of Ruston, president; C. F. Bartels of New Orleans, president-elect; S. V. Vega of Donaldsonville, first vice-president; John C. Hardin, Sr., of Shreveport, second vice-president; Julian S. Bernhard of Shreveport, secretary; Oscar J. Ory, Sr., of Garyville, treasurer.

Maine • Alva S. Appleby of Skowhegan, president; George T. Dyer of Rumford, president-elect; Levi Trundy of Presque Isle, vice-president; Stanley M. Gowen of Skowhegan, secretary; Edward W. Peaslee of Augusta, treasurer.

Maryland • C. L. Inman, Sr., of Baltimore, president; Meyer Eggnatz of Baltimore, president-elect; J. D. Cross of Leonardtown, vice-president; E. L. Pessagno, Jr., of Baltimore, secretary; S. H. Bryant of Baltimore, treasurer.

Massachusetts • F. A. Trevor of Melrose, president; Ivor P. Muzzey of Athol, president-elect; Raymond J. Nagle of Boston, vice-president; Harold E. Tingley of Boston, secretary; Glenn W. Lawrence of Boston, treasurer; Evelyn F. Eaton of Boston, executive secretary.

Michigan • Harlow L. Shehan of Jackson, president; Glenn R. Brooks of Rochester, president-elect; Arthur V. Diedrich of Detroit, vice-president; Frederick Wertheimer of Lansing, secretary; Alfred H. Lowther of Detroit, treasurer; H. C. Gerber, Jr., of Lansing, executive secretary.

Minnesota • F. P. Hosterman of Minneapolis, president; D. W. Wilson of Belle Plaine, president-elect; R. G. Aysta of Virginia, vice-president; Carl V. E. Cassel of St. Paul, secretary; C. D. East of Duluth, treasurer.

Mississippi • G. A. McCarty of Jackson, president; F. C. Sneed of Osyka, president-elect; J. S. Pittman of Greenwood, first vice-president; J. H. Stone of Vicksburg, second vice-president; D. C. Easley of McComb, third vice-president; H. M. Campbell of Tupelo, secretary-treasurer.

Missouri • A. F. Schopper of Kansas City, president; James E. Weedin of St. Joseph, president-elect; Claude D. Owens of Kansas City, first vice-president; H. H. Cornwall of Charleston, second vice-president; James E. Rook of St. Louis, third vice-president; Reuben R. Rhoades of Jefferson City, secretary-treasurer; Betty Satterfield of Jefferson City, executive secretary.

Montana • Chas. N. Gray of Glasgow, president; R. G. Murphy of Missoula, president-elect and vice-president; C. S. Renouard of Butte, secretary-treasurer.

Nebraska • M. C. Pedersen of Lincoln, president; C. C. Lillibridge of Crete, president-elect; F. A. Pierson of Lincoln, secretary; T. P. Mullins of Chadron, treasurer.

Nevada • L. G. Jacob of Reno, president; Clifford A. Paice of Reno, president-elect; Walter R. Bell of Reno, vice-president; Raymond La Fond of Reno, secretary-treasurer.

New Hampshire • Wm. A. Young, Jr., of Concord, president; Karl F. Lund of Claremont, president-elect; William F. Stuart of Claremont, vice-president; Floyd E. Williams of Manchester, secretary; Robinson C. Frost of Manchester, treasurer.

New Jersey • Louis A. Saporito of Newark, president; Benjamin Rosenwasser of Union City, president-elect; Richard S. Cranmer of Camden, vice-president; John G. Carr of Camden, secretary; Stephen M. Lyons of Summit, treasurer.

New Mexico • M. S. Smith of Clovis, president; John K. Phelan of Albuquerque, president-elect; John S. Eilar of Albuquerque, secretary-treasurer; Glen W. Thurman of Albuquerque, executive secretary.

New York • Donald H. Miller of Elmira, president; Willard S. Bell of Ozone Park, president-elect; Leo W. Roohan of Saratoga Springs, vice-president; Charles A. Wilkie of Brooklyn, secretary; Geo. D. Greenwood of Rochester, treasurer.

North Carolina • R. F. Hunt of Rocky Mount, president; A. C. Current of Gastonia, president-elect; Guy Willis of Durham, vice-president; Bernard N. Walker of Charlotte, secretary-treasurer.

North Dakota • Rudolph L. Bork of Bismarck, president; H. H. Pfister of Wahpeton, president-elect; J. H. Lunday of Fargo, secretary; O. H. Hoffman of Hannaford, treasurer.

Ohio • Ralph E. Creig of Cleveland, president; Earl D. Lowry of Columbus, president-elect; A. C. Heibert of Akron, vice-president; Earl G. Jones of Columbus, secretary-treasurer.

Oklahoma • Harry N. Wagner of Henryetta, president; William P. Ringo of Bartelsville, president-elect; W. C. Travis of Chickasha, vice-president; Rolla C. Calkin of Guthrie, secretary-treasurer; H. Leon Snow of Oklahoma City, executive secretary.

Oregon • Willard H. Hurley of Portland, president; Chalmer L. George of Portland, president-elect; Harold M. Kramer of Portland, vice-president; H. C. Fixott, Jr., of Portland, secretary-treasurer.

Panama • A. Earle Gerrans of Balboa, president; Ovid Slavin of Balboa, secretary-treasurer.

Pennsylvania • Paul E. Bomberger of Lancaster, president; Frederick W. Herbine of Reading, president-elect; James W. Lynam of Johnstown, and John E. Whittaker of Williamsport, vice-presidents; Miles D. Zimmerman of Pottsville, secretary; Dale M. Wampler of Harrisburg, treasurer; Ray Cobaugh of Harrisburg, executive secretary.

Puerto Rico • Hector L. Bruno of Guayama, president; Arturo Benavent, Jr., of Mayaguez, first vice-president; Roberto Alvarez of Caguas, second vice-president; Reinaldo Carrasquillo of Rio Piedras, secretary; Hermes Velez Franceschi of Bayamon, treasurer.

Rhode Island • Archie A. Albert of Pawtucket, president; James F. Colgan of Pawtucket, president-elect; Allyn F. Sullivan of Providence, vice-president; Morris L. Biderman of Providence, recording secretary; N. G. Migliaccio of Providence, treasurer; Edgar L. Bessette of Cranston, financial secretary.

South Carolina • J. W. Douglass of Greenville, president; C. E. Saunders of Columbia, president-elect; F. B. Hines of Hartsville, vice-president; J. R. Owings of Greenville, secretary-treasurer.

South Dakota • Jay C. Spink of Huron, president; I. G. Bergh of Watertown, president-elect; W. H. Morgans of Aberdeen, vice-president; Ernest W. Elmen of Sioux Falls, secretary; R. W. Force of Estelline, treasurer.

Tennessee • O. M. Jamieson of Memphis, president; Harry M. Underwood of Knoxville, president-elect; Walter C. Cummins of Harriman, and Robert B. Bogle, Jr., of Nashville, vice-presidents; Wayne L. McCulley of Cleveland, secretary-treasurer; T. T. McLean of Nashville, executive secretary.

Texas • W. Talbot Foster of San Antonio, president; D. C. McRimmon of Fort Worth, president-elect; Raymond D. Snider of Houston, Loyd Brasher of McAllen, and Joe M. Cook of Waco, vice-presidents; Willard Ogle of Dallas, secretary-treasurer.

Utah • W. L. Warburton of Salt Lake City, president; Bruce P. McBride of Salt Lake City, president-elect; E. O. Thompson of Salt Lake City, secretary-treasurer.

Vermont • Louis E. Hope of Ludlow, president; Dante Aimi of Barre, president-elect; Howard D. Slack of Burlington, vice-president; William J. Reardon of Rutland, secretary; Richard H. Conklin of Burlington, treasurer.

Virginia • J. H. Cocks of Farmville, president; R. P. Stickley of Lynchburg, president-elect; J. E. John of Roanoke, secretary-treasurer.

Washington • Fred J. Dingler of Seattle, president; J. D. Walker of Chehalis, president-elect; Clyde R. Flood of Seattle, secretary-treasurer.

West Virginia • D. E. Gaines of Clarksburg, president; Wm. R. Loper of Wheeling, president-elect; Carl L. Kennedy of Montgomery, vice-president; A. B. Drake of Huntington, secretary; John S. Stone of Clarksburg, treasurer.

Wisconsin • O. M. Dresen of Milwaukee, president; E. D. Calkins of Racine, president-elect; Henry F. Hahn of Milwaukee, first vice-president; W. H. Wendt of Madison, second vice-president; R. A. Mason of Milwaukee, secretary; C. P. Collins of Kenosha, treasurer; Kenneth Crane of Milwaukee, executive secretary.

Wyoming • J. T. Lane of Rock Springs, president; C. M. Stebner of Laramie, president-elect; C. H. Carpenter of Casper, vice-president; T. J. Drew of Cheyenne, secretary-treasurer.

Armed Forces

AIR FORCE TRAINS DENTAL TECHNICIANS AT N. Y. SCHOOL

The U. S. Air Force Medical Service has arranged training of 180 dental laboratory technicians, at a civilian school, to help alleviate the critical shortage in this field, according to an announcement from the office of the Air Force Surgeon General.

The first group of 60 students on July 9 entered the School of Dental Laboratory Technology, New York State Institute of Applied Arts and Sciences; the second and third groups of 60 each will enter the School at 18 week intervals, the report stated. Students selected are from basic trainees at indoctrination centers and from enlisted personnel assigned to dental work in the Air Force.

BREAK GROUND FOR NEW ARMED FORCES PATHOLOGY INSTITUTE

Ground was broken on July 10 for the new Armed Forces Institute of Pathology building, at the Army Medical Center, Washington, D.C., by Maj. Gen. G. E. Armstrong, Army Surgeon General.

The $7,250,000 structure which, it is expected, will be completed in two years, will provide approximately 200,000 square feet of working space and will be equipped with the most modern scientific working equipment, it is reported.

The new structure will house the National Dental Museum, as well as the Laboratories of Pathology which furnish consultative and diagnostic services, the American Registry of Pathology, the Medical Illustration Service, and the Medical Museum.

The present structure occupied by the Institute was built in 1887.

ARMY TO CALL 28,000 MEN IN AUGUST AND SEPTEMBER

The Army has boosted to 28,000 its earlier request to Selective Service for 22,000 men in August, and has requested 28,000 men for September, according to a Defense Department announcement. In addition, 7,000 men in August and 6,000 men in September, are to be assigned to

the Marines, the Defense Department stated.

Dental Personnel • Although some Priority I physicians registered with Selective Service faced the possibility of being drafted because of the inadequate number of volunteers, Selective Service spokesman stated in July that at that time the dental needs of the services were being filled by volunteers.

GENERAL SMITH, FORMER ARMY DENTAL CHIEF, RETIRES

Maj. Gen. Thomas L. Smith, DC, special assistant to the Surgeon General of the Army and former chief of the Dental Corps, has been retired after 35 years' active duty in the Dental Corps.

General Smith received his dental degree from Southern Dental College in 1916, and the same year was commissioned a first lieutenant in the Dental Corps. He served as division dental surgeon with the 80th Infantry Division in World War I, and was dental surgeon of the European Theater of Operations during World War II. He was made chief of the Dental Division, Surgeon General's Office, in March 1946, and was appointed special assistant to the Surgeon General in 1950.

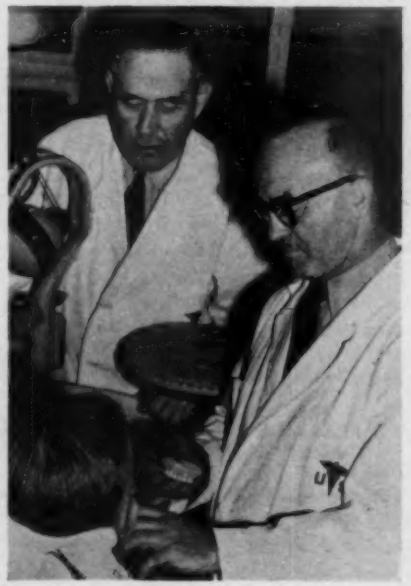
General Smith was the first Army dental officer to be given the permanent rank of Major General in the U. S. Army.

BLAKE TO HEAD ARMY MEDICAL RESEARCH BOARD

The appointment of Francis G. Blake, Sterling professor of medicine at Yale University medical school, as scientific director, Medical Research and Development Board, Office of the Army Surgeon General, has been announced.

In his new position, described as "the highest and most responsible civilian post in medical research in the Army," he will assist in planning and supervising the Army Medical Service research and development program. Over 200 projects in dental, medical and veterinary fields are reported to be already under way.

Dr. Blake recently resigned from the chairmanship of the Medical Research and Development Board of the Defense Department. During World War II he served in a civilian capacity as consultant to the Secretary of War.



Lt. Col. Arthur H. Schmidt (right), on duty in Wiesbaden with the U.S. Air Forces in Europe, has recently been awarded the Air Force Specialty Code of 3175A. The suffix "A" indicates the highest degree of skill being practiced in Air Force dentistry. Colonel Schmidt, who is assistant chief of dental service with the 495th Medical Group, Wiesbaden Military Post Air Force Hospital, is the only dentist in the Air Force who has been awarded this Air Force Specialty Code in prosthetics.

At the left is Col. M. E. Kennebeck, chief of dental services for the Post Hospital.

Legislation

PROPOSE FREE HOSPITAL CARE FOR OVER 65 AGE GROUP

A free hospitalization plan for the aged and dependent groups, proposed by Oscar R. Ewing, Federal Security administrator, is reportedly being drafted into a bill to go before Congress.

The plan, which has Administration approval, would provide 60 days hospitalization each year, at Government expense, for all persons over 65 who are entitled to social security cash benefits, regardless of whether they are receiving them. Widows under 65 with dependent children, and any other survivors entitled to social security benefits, also would be eligible for free hospitalization.

Cost during the first year is estimated at $200,000,000, on the basis of 7,000,000 persons' being eligible in 1953, of which 5,500,000 will be 65 or over, and the remainder widows and dependent persons.

The proposal came soon after publication, June 18, of the first issue of the new FSA publication, *Aging*, which, according to Mr. Ewing, is the result of the "many proposals . . . for the creation of a clearing house of information about work in this new and pressing field," which were made during the Conference on Aging held in Washington last year and which he states have been received in increasing numbers since that time.

Identical resolutions calling for creation of a special committee to study problems of aging were introduced in the House late in June by Rep. R. Bolling (D., Mo.), C. P. Case (R., N. J.), and J. W. Heselton (R., Mass.).

INCOME TAX DEDUCTION OF ALL DENTAL EXPENSES IS PROPOSED

Deduction from gross income, for income tax purposes, of all dental and medical expenses regardless of amount, is proposed in a bill (HR 4405) introduced on June 12 by Rep. L. G. Clemente (D., N. Y.). Premiums for accident or health insurance also could be deducted under the measure.

Similar proposals were made in bills (HR 14 and HR 493) introduced by Representative-at-Large J. Caleb Boggs (R., Del.) and Rep. K. B. Keating (R., N. Y.).

NEW JERSEY DENTAL CLINICS TO BE REGULATED & LICENSED

Dental clinics in New Jersey will be regulated and licensed under a bill signed into law on June 12 by Governor Driscoll.

The bill defines a dental clinic as "any clinic, infirmary, hospital, institution or other place of any kind whatsoever, in which the science of dentistry in any of its branches is practiced, demonstrated or taught . . . but shall not include the private office of a regularly licensed dentist of this state." Rules and regulations for the operation of dental clinics are to be established by a five member council.

In another bill signed by the Governor, any dental hygienist who fails to produce an annual certificate of registration is liable to be suspended from practice.

DENTAL LABORATORIES NEED NOT POST CEILING PRICES

Dental laboratories are not required to post ceiling prices. However, they must keep them on file and must also file them with local Office of Price Stabilization offices which, if requested, will keep them confidential.

This recent OPS interpretation of Regulation 34 supersedes that reported in the July issue of THE JOURNAL.

International

F.D.I. URGES FLUORIDE PROGRAMS FOR ALL NATIONS

All nations should utilize such preventive measures as fluoridation of water supplies as a means of reducing the incidence of dental caries, before undertaking programs that would result in emphasis on restorative dentistry. This was the substance of a resolution adopted by the Executive Council of the Fédération Dentaire Internationale, at the thirty-ninth annual meting of the F.D.I. in Brussels, Belgium, June 9-17, according to Harold Hillenbrand, secretary of the Association, who attended it.

The action taken by the Council, headed by Charles F. L. Nord of Holland, was taken after the members of the Oral Hygiene Commission had heard a discussion of fluoridation technics and their results in the United States, presented by Bruce D. Forsyth of Washington, D. C., chief dental officer of U. S. Public Health Service, and Dr. Hillenbrand.

Controversy regarding a proposal to reorganize the F.D.I. to make it a federation of national dental societies only, with no individual direct memberships permitted, resulted in approval of the plan in principle and of a revision of the statutes to allow each national society to decide whether to permit "supporting memberships" from its country. Voting strength would be based on dental population. Final action on the proposed revision of the statutes will be taken at the 1952 meeting of the F.D.I. sponsored International Dental Congress in London, July 19-26.

Formal consultative relationship with the World Health Organization having been established, a commission of the F.D.I. was created at the meeting whose function will be to supply dental information to WHO when it is requested, Dr. Hillenbrand reported. Members of the commission are A. E. Rowlett of England, honorary president of the F.D.I.; C. de Vere Green of England; and R. Jaccard of Switzerland.

Oren A. Oliver of Nashville, Tenn., received a special commendation at the meeting for his membership drive which resulted in more than 1,000 United States members.

Twenty nations were represented at the meeting, which was held in conjunction with the twenty-fifth anniversary of the Belgian Dental Society. In attendance representing U. S. dentistry on the Executive Council were, in addition to Dr. Forsyth and Dr. Hillenbrand, Rear Admiral Alfred W. Chandler of Washington, D. C., vice-president of the Association, and Wilson K. Fisher of Evanston, Ill.

International Dental Congress • About 350 U. S. dentists already have stated their intention to attend or to participate in the International Dental Congress sponsored by the F.D.I., to be held in London July 19-26, 1952, it has been reported. Scientific reports to be presented for discussion at the Congress will be published in the four issues of the *International Dental Journal* dated September 1951 to June 1952. Subjects include anesthesia, pedodontics, dental caries, restorative dentistry, endodontia, occlusal relationships, partial dental prosthesis, full denture prosthesis, orthodontics, periodontal diseases, anatomy and histology, oral pathology, oral medicine, oral surgery, dental education, dental materials, and public dental service. Preliminary readings of the reports will make for more fruitful discussion during the Congress, when only summaries of the reports will be presented in order to stimulate discussion, officers of the Congress explained.

Subscriptions to the *International Dental Journal* can be obtained for $8.50 per year from British Publications, Inc., 150 East 35th Street, New York. Subscription for members of the Fédération is $7.65.

MILITARY MEDICINE GROUP CREATES DENTAL DIVISION

A dental division was added to the International Commission on Military Medicine and Pharmacy at the meeting of the Commission in Paris in June.

Among those in attendance from the United States were Rear Admiral Alfred W. Chandler of Washington, D.C., vice-president of the Association; Bruce D. Forsyth of Washington, D.C., chief dental officer of U. S. Public Health Service; and Maj. Gen. George R. Kennebeck, chief of the U. S. Air Force Dental Division, as well as others who had earlier attended the meetings of the Fédération Dentaire Internationale in Brussels, Belgium.

MARTHA ELIOT RESIGNS WHO POST, REPLACED BY CANDAU

The resignation of Martha Eliot, and the appointment of Marcellino Gomes Candau of Brazil to replace her as assistant director general of the World Health Organization in charge of advisory services, has been announced by Brock Chisholm WHO director general.

Dr. Eliot, before joining the WHO staff in 1949, was associate chief of the United States Children's Bureau and participated in WHO as a United States delegate. She is credited with a major part in bringing about the establishment of maternal and child health work as a priority program for WHO.

Dr. Candau was formerly director of the WHO Division of Organization of Public Health Services. He received his medical training at the School of Medicine of the State of Rio de Janeiro and at the School of Hygiene and Public Health of Johns Hopkins University in Baltimore. Before joining the WHO staff a year ago, he was superintendent of a cooperative public health program of the Brazilian Government and the Institute of Inter-American Affairs.

Pan American Sanitary Bureau, WHO Regional Office • The resignation of John R. Murdock, and the appointment of Paulo C. Antunes to succeed him as assistant director of the Pan American Sanitary Bureau, regional WHO office, has been announced by Fred L. Soper, director of the Bureau.

Dr. Murdock terminated fifteen years of service with the Bureau to return to U. S. Public Health Service, where he holds the rank of medical director.

New Regional Office Address • New address of the Pan American Sanitary Bureau, Regional Office of the World Health Organization, is 1501-15 New Hampshire Avenue, N. W., Washington, D. C.

BRITAIN MAY TRAIN NURSES TO TREAT CHILDREN'S TEETH

Legislation to permit training of dental nurses to extract and fill children's teeth is being drafted in England by the Ministry of Health, according to a report in the *Daily Mail*, British newspaper.

The bill, which is reportedly being drafted in consultation with the dental profession, is said to be "the result of the mass drift from the school dental service into lucrative private practice," and to be based on reports by a commission of British dentists and government officials who studied a similar scheme in operation in New Zealand.

The probability is suggested that the present school dental service will be largely scrapped, and an official of the British Dental Association is quoted as saying that "the snag arises in training [since the] staffs in dental schools are already overworked because of the increase in the number of students." Two years' training is proposed, the report states. Present legislation permits unqualified assistants to perform only scaling and polishing.

Dental Education

BURKET REPLACES APPLETON AS DEAN AT U. OF PENNSYLVANIA

Lester W. Burket, vice chairman of the Council on Dental Therapeutics of the Association, became dean of the Thomas W. Evans Museum and Dental Institute, dental school of the University of Pennsylvania, on July 1. He will continue to serve as professor of oral medicine and director of postgraduate courses.

L. W. Burket

Dr. Burket replaced J. L. T. Appleton, who resigned from the deanship, which he had held for ten years, in order to devote full time to his research and teaching activities as professor of microbiology in the dental school. Dr. Appleton is chairman of the Council on Dental Research of the Association.

POSTGRADUATE AND REFRESHER COURSES

University of Michigan • The University of Michigan, W. K. Kellogg Foundation Institute, has announced its schedule of postgraduate courses for the coming school year. Subjects and dates of 29 one-week and two-week courses are as follows: complete denture prosthesis, October 1-12, January 7-18, and May 12-23; operative dentistry, October 1-12, and February 11-22; partial denture prosthesis, October 29-November 9, January 21-February 1, and May 26-June 6; crown and bridge prosthesis, October 29-November 9, February 25-March 7, and May 5-16; minor oral surgery, November 5-16, January 21-February 1, March 10-21, and May 5-16; endodontics, November 26-December 7, February 25-March 7, and May 5-16; dentistry for children, December 3-14, February 25-March 7, and May 19-30; periodontics, December 10-21, and March 10-21; operative and interpretive dental roentgenology, January 7-11, and March 31-April 4; orthodontics for the general practitioner, January 7-18; oral pathology and diagnosis, January 21-February 1; crown and bridge precision attachment, March 10-21; and dental therapeutics, March 10-14.

Six one-day-a-week courses include complete denture prosthesis, partial denture prosthesis, periodontics, anatomy of the head and neck, crown and bridge prosthesis, and endodontics. Twenty-six one-week courses in Airdent are scheduled, the first one beginning October 8. A course for dental assistants is scheduled for May 12-16, and a course in roentgenography for dental hygienists will be held May 19-23.

Further details may be obtained by writing to William R. Mann, assistant director, W. K. Kellogg Foundation Institute, Graduate and Postgraduate Dentistry, University of Michigan, Ann Arbor, Mich.

Ohio State University • The Ohio State University College of Dentistry has announced its autumn schedule of postgraduate courses.

Subjects, dates and instructors are as follows: anatomy of head and neck, September 24-28, by Linden F. Edwards; general anesthesia, October 8-12, by Morgan L. Allison; partial denture prosthesis, October 29-November 2, by Victor L.

Steffel; oral pathology, October 29-November 2, by H. B. G. Robinson; oral surgery, November 5-9, by D. P. Snyder; full denture prosthesis, November 12-16, by Carl O. Boucher; periodontics, December 3-7, by John R. Wilson; roentgenology, December 3-7, by H. D. Spangenberg. In addition, courses in airbrasive technic will be offered weekly from August 6 through December 3, conducted by John P. Beckwith, Harry H. Postle, and John N. Bowers.

Enrollment is limited to approximately ten in each class. Fee is $50 for each course with the exception of oral surgery and airbrasive technic, for which the fee is $100.

Further information may be obtained from the postgraduate division, College of Dentistry, Ohio State University, Columbus 10, Ohio.

University of Toronto • The University of Toronto Faculty of Dentistry has announced a series of short, intensive courses for dentists during the 1951-52 session, arranged and conducted by the staff of the dental school with the cooperation and financial support of the W. K. Kellogg Foundation of Battle Creek, Mich.

Subjects and dates of the courses, in which instruction will be given through lectures, seminars, and clinical demonstration, are as follows: anatomy as applied to dentistry, September 12-14; periodontics, October 29-November 2 and April 28-May 2; orthodontics (for the general practitioner) November 5-9, and March 31-April 4; dental oral surgery and anesthesia, November 19-23; dental public health conference, November 20-21; cephalometric technics (for specialists only), January 28-30; operative dentistry, February 18-22; dental roentgenology, February 25-March 1; dental caries; etiology and prevention, March 6-8; endodontics, March 10-14; pedodontics, April 14-16; dental oral surgery and anesthesia, April 21-25.

Enrollment is limited to from 6 to 14 in all courses except pedodontics. Fees are $75 for a five-day course, $50 for a three-day course, and $10 for the dental public health conference.

Inquiries should be addressed to the dean, Faculty of Dentistry, University of Toronto, 230 College Street, Toronto 2-B, Ont.

DENTAL SEMINARS ANNOUNCED BY ARMED FORCES INSTITUTE

The oral pathology section of the Armed Forces Institute of Pathology has announced a series of dental seminars devoted to a correlation of the principles of oral pathology to the clinical practice of dentistry, beginning in June and continuing through June 1952. The program will be under the direction of Col. Joseph L. Bernier, chief, oral pathology section, Armed Forces Institute of Pathology.

Collectively, the lectures will constitute an accredited training program for which the Armed Forces Institute of Pathology training certificate will be awarded. Because of space limitations at the Institute, attendance will be by invitation.

TORONTO OFFERS TWO YEAR DENTAL HYGIENE COURSE

The University of Toronto Faculty of Dentistry has announced the establishment of a two-year course for the training of dental hygienists, to begin in September.

Details may be obtained by writing to the dean, Faculty of Dentistry, University of Toronto, 230 College Street, Toronto 2-B, Ontario.

174 NEW JERSEY DENTISTS TAKE ORAL CANCER COURSES

A total of 174 New Jersey dentists, during the last two years, have received special training in oral cancer in a series of

courses sponsored jointly by the New Jersey State Dental Society and the State Department of Health, it is reported by Earl G. Ludlam, chief of the bureau of dental health of that state.

Tuition was paid by the bureau of dental health of the State Health Department, with Federal funds assigned to the state for cancer control purposes, and each dentist received a per diem expense allotment. Dentists who attended the courses were selected by their local component dental societies.

The courses, conducted under the overall supervision and coordination of Neal W. Chilton of the New Jersey Department of Health, were given in Philadelphia at the University of Pennsylvania dental school, the University Hospital, and the American Oncologic Hospital; and in New York at the School of Dental and Oral Surgery of the Faculty of Medicine of Columbia University, the Presbyterian Hospital, at the New York University dental school, and at Bellevue Hospital.

It is expected that similar courses will be conducted next year, Dr. Ludlam reported.

GIFTS TO HEBREW UNIVERSITY INCLUDE DENTAL JOURNALS

The library of the Hebrew University, Jerusalem, has received a gift of three-year subscriptions to all the major dental journals in the English language, from the newly created National Dental Division of the American Friends of the Hebrew University.

The gift of 21 American, one Canadian, two British and two Australian monthly periodicals is described by George Stein, president of the A.F.H.U., who announced it, as the first of numerous essential services the National Dental Division plans to render to the Hebrew University in Israel. Establishment of dental scholarships, supplying of equipment for dental clinics and experimental laboratories, sponsoring of research, dental health education of the public, and active assistance in the establishment and maintenance of a dental school at the Hebrew University also are planned, Dr. Stein states.

Hebrew Medical Journal • Another aid to the Hebrew University is the *Hebrew Medical Journal* (Harofé Haivri), which, with its Spring 1951 issue, celebrated its twenty-fourth year of publication in this country under the editorship of Moses Einhorn of New York. The journal is written in Hebrew with English summaries.

Public Health

USPHS CAREER EXAMINATION DEADLINE IS AUGUST 25

Applications to take the September 25-27 examinations for appointment to the Regular Commissioned Corps of the U.S. Public Health Service must be in the Washington office by August 25, it has been announced. The examinations, which are competitive, will include written tests, a practical demonstration, an oral interview, and a physical examination.

Appointments are permanent and provide opportunities for career service in clinical, public health, and research dentistry. Appointments will be made in the grades of assistant and senior assistant, equivalent to Navy ranks of lieutenant (j.g.) and lieutenant, respectively. Entrance pay is $5,685.56 for assistant dental surgeons with dependents, and $6,546 for senior assistants, including rental and subsistence allowance. Applicants must have their dental degree in prospect by June 1952, and by that time must have completed a total of seven years of training and professional experience subse-

quent to high school. All applicants must be citizens of the United States.

Application forms and additional information may be obtained by writing to the Surgeon General, U.S. Public Health Service, Federal Security Agency, Washington 25, D.C., for the attention of the Division of Commissioned Officers.

SODIUM FLUORIDE ENCLOSED IN CORNERSTONE FOR N.I.H. UNIT

Sodium fluoride was among the chemicals and vaccines placed within the cornerstone of the new Clinical Center of the National Institutes of Health at Bethesda, Md., when it was laid by President Truman on June 22. The fluoride was chosen as symbolic of current achievement in research and prevention of disease.

The new $40,000,000, 14 story research hospital is to have 500 beds and twice as much space for laboratories as for patient care, it is reported. Anticipated opening date is January 1953.

16 DENTAL SCHOOLS GET USPHS GRANTS FOR CANCER TEACHING

A total of $72,657 in grants to 16 dental schools, to improve instruction in cancer diagnosis and treatment, were announced on July 13 by Oscar R. Ewing, Federal Security administrator. The grants, made by the Cancer Institute of the National Institutes of Health, were approved by Leonard A. Scheele, USPHS Surgeon General, following recommendations made by the National Advisory Cancer Council.

The dental schools, program directors, and amounts of the grants are as follows:

University of California, San Francisco, Hermann Becks, $4,698; University of Louisville, Louisville, Ky., Dan Y. Burrill, $5,000; Northwestern University, Chicago, F. W. Merrifield, $4,000; University of Indiana, Indianapolis, Maynard K. Hine, $3,780; University of Maryland, Baltimore, M. S. Aisenberg, $5,000; University of Detroit, B. E. Rynearson, $5,000; University of Michigan, Ann Arbor, Donald A. Kerr, $5,000; University of Minnesota, Minneapolis, David F. Mitchell, $5,000; St. Louis University, St. Louis, William H. Bauer, $5,000; University of Kansas City, Kansas City, A. E. Upsher, $5,000; Creighton University, Omaha, Joseph A. Gibilisco, $3,979; University of Nebraska, Lincoln, D. T. Waggener, $5,000; University of Buffalo, Buffalo, Harold A. Solomon, $4,995; Western Reserve University, Cleveland, Thomas J. Hill, $4,914; University of Pennsylvania, Philadelphia, Paul E. Boyle, $5,000; Medical College of Virginia School of Dentistry, Richmond, George Z. Williams, $5,000.

FLUORIDATION PLANNED IN SAN JUAN, P. R.

The sum of $60,000 for fluoridation of the water supply in San Juan, P. R., has been requested of the legislature by Juan A. Pons, commissioner of health, according to a report received from Juan Font Suarez of Santurce.

Doctor Font reports also that a decision to intensify the dental care among school children in the first three elementary grades, in order to accomplish positive preventive measures in this group, has been made as a result of the proposals recommended by Jose M. Gonzales, consultant to the dental bureau of the Insular Health Department.

MARTHA ELIOT TO HEAD U. S. CHILDREN'S BUREAU

The resignation of Katharine F. Lenroot as chief of the Children's Bureau of the Federal Security Agency, and the nomination of Martha M. Eliot to succeed her, was announced on July 9. Miss Lenroot, who retired after 36 years' service with the Bureau, was appointed its chief in 1934 by President Roosevelt.

Dr. Eliot was associate chief of the Children's Bureau before her appointment in 1949 as assistant director general of the World Health Organization in charge of advisory services (see story, page 233).

Approximately 38 public health dentists, state sanitary engineers and chemists on April 25-26 made a field trip to inspect fluoridation methods and equipment in nine Wisconsin cities, at the invitation of the Wisconsin State Board of Health. The trip was made during the annual orientation conference of state dental directors in seven midwestern states and dental personnel of U.S. Public Health Service, Regions IV and V.

Shown here at the Watertown water treatment plant are (l. to r.), seated: A. C. Jenzig of Minneapolis, senior chemist and bacteriologist, Minneapolis Water Department; Harvey E. Wirth of Madison, principal public health engineer, Wisconsin State Board of Health; William A. Jordan of Minneapolis, director, division of dental health, Minnesota Department of Health; J. A. Sampson of Des Moines, assistant public health engineer, Iowa Department of Health; J. E. Vogt of Lansing, sanitary engineer, Michigan State Department of Health; John E. Chrietzberg of Springfield, Ill., chief, bureau of dental health, Illinois Department of Public Health; L. S. Kleinschmidt of Chicago, health program representative, Regions IV and V, USPHS; L. H. Male of Cleveland, regional engineer, Region IV, USPHS; W. Philip Phair of Chicago, assistant secretary of the Council on Dental Health of the Association; Fred Wertheimer of Lansing, Mich., chief, public health dentistry section, Michigan State Department of Health; D. W. Evans of Chicago, sanitary engineer director, Region V, USPHS; H. Knox of Columbus, Ohio, principal assistant engineer, Ohio State Health Department; F. A. Bull of Madison, director of dental health, Wisconsin State Board of Health; F. J. Maier of Washington, D.C., sanitary engineer, USPHS; J. F. Lewis of Chicago, dental consultant, Regions IV and V, USPHS; M. S. Nichols of Madison, chief, laboratory service, Wisconsin State Board of Health; M. A. Schlueter, Watertown dentist; John Peterson of Minneapolis, assistant dental director, Minnesota Department of Health; R. V. Harte and C. L. Bergman, Watertown dentists; F. Koenig, Watertown water commissioner; and Obed H. Moen of Watertown, trustee of the Association from the Ninth District.

Standing are L. L. Halladay of Minneapolis, waterworks engineer; L. D. Hudson, sanitary engineer, Illinois Department of Health; J. C. Muhler of Indianapolis, department of chemistry of the University of Indiana; C. L. Howell of Indianapolis, assistant director, and R. D. Smiley of Indianapolis, director, division of dental health, Indiana State Department of Health; R. T. Beckman of Chicago, engineer, Wallace and Tiernan Co., Inc.; M. Tiernan of Wallace and Tiernan Company, Newark, N. J.; C. Stravinski of Madison, Wis., sanitary engineer, Wisconsin State Board of Health.

Part of the fluoridation installation can be seen in the left background.

SUGAR CONSUMPTION IN 1950 WAS 100 POUNDS PER PERSON

Average sugar consumption per person in the United States last year was 100 pounds, according to a recent report in *The Market Basket*, U. S. Department of Agriculture publication.

The sugar was from the following sources, the report stated: 56 pounds from the grocery store; 10 pounds contained in soft drinks and other beverages; 10 pounds in pies and other bakery goods; 9 pounds in candy and confections; 7 pounds in commercial jams, jellies and canned fruits; 5 pounds from miscellaneous sources; and 3 pounds in ice cream.

The National Confectioners' Association recently estimated the 1950 candy consumption at 18.1 pounds per person as compared with 17.3 pounds in 1949. (See editorial, page 215.)

General

FOURTH NEW ORLEANS DENTAL CONFERENCE SET FOR NOVEMBER

The fourth annual New Orleans Dental Conference will be held November 11-14 at the Roosevelt Hotel, it has been announced by Wallace M. Nicaid, chairman, who states that all members of the Association are invited to attend.

The conference, designed to present advanced scientific knowledge to the dental profession of the South and of Latin America, will include general and limited attendance clinics, motion picture programs, and commercial, scientific and health exhibits.

Clinicians and their subjects are: Drexell A. Boyd of Indianapolis, plastic fillings; Alvin D. Farver of Miami Beach, Fla., hydrocolloid technic; Clifford S. Kile of Hutchinson, Kan., full dentures; Alton Ochsner of New Orleans, detection and diagnosis of premalignant and malignant lesions of the oral cavity; L. W. Peterson of St. Louis, oral surgery and anesthesia; Edward J. Ryan of Evanston, Ill., psychosomatic principles in dental practice; John R. Wilson of Columbus, Ohio, periodontics.

Inquiries are to be addressed to the New Orleans Dental Conference, 629 Maison Blanche Building, New Orleans.

OVER $5,000,000 SPENT ON 1950 DENTAL PRODUCT ADVERTISING

More than five million dollars was spent on dental product advertising in national newspapers during 1950, according to *Advertising Age*.

Advertising expenditures for dental items included the following:

Dr. Lyons Ammoniated Tooth Powder	$ 24,741
Dr. Lyons Tooth Powder	94,933
Dr. Lyons Dentifrices	28,458
Phillips Milk of Magnesia Toothpaste	54,469
Squibb Dental Cream	151,482
Denture-Eze	31,647
Peb-Ammo Ammoniated Tooth Paste	214,806
Amurol Dentifrices	44,727
Craig-Martin Ammoniated Toothpaste	28,646
Fasteeth	305,051
Plato	10,516
Colgate Ammoniated Tooth Powder	351,040
Colgate Dental Cream	1,817,537
Forhan's Toothpaste	59,194
Amm-I-Dent Toothpaste	533,823
Amm-I-Dent Tooth Powder	9,653
Amm-I-Dent Dentifrices	94,605
Dentur-Grip	5,137
Polident	127,147
Poli Grip	110,194
Hope Denture Powder	3,828
Kolynos	43,129
Brimms Plastic Liner	86,444
Ipana	230,710
Pepsodent Tooth Paste	581,086
Listerine Tooth Paste	43,535

The figures were quoted from a study made by the Bureau of Advertising, American Newspaper Publishers Association, which included national advertisers in 995 daily and 364 Sunday newspapers, who had invested $25,000 or more during 1950.

EDUCATIONAL BROADCASTING TO BE AIDED BY KELLOGG GRANT

A grant of approximately a quarter of a million dollars for the promotion of educational broadcasting, including programs on health, has been announced by the W. K. Kellogg Foundation. The grant is toward the support of a five year "tape-recording network" to be sponsored by the National Association of Educational Broadcasters.

Tape recordings of educational programs will be circulated to those of the hundred or so noncommercial, educational stations which are strong stations operated with professional standards for large audiences. The network is intended to help the stations to exchange their best

programs and thus enable them to concentrate on improving their own program-making efforts, the Foundation states. Several annual series of health broadcasts are included in the plans.

The University of Illinois will act as a disbursing agent for the project, it is reported.

It is understood that funds for the production of the programs are being made available by the Ford Foundation, in a parallel project.

SPENCER TO HEAD DEFENSE MEDICAL SERVICES COMMITTEE

Thomas B. Spencer of Washington, D. C., has been named executive director of the Committee on Medical Services of the Research and Development Board of the Defense Department. Lloyd Mussells of Rochester, N. Y., is the new deputy executive director of the Committee, the position formerly held by Dr. Spencer. Dr. Mussells is on leave of absence from Strong Memorial Hospital in Rochester.

PEDODONTISTS TO MEET IN WASHINGTON IN OCTOBER

The American Society of Dentistry for Children will hold its twentieth annual meeting October 12-14 in Washington, D.C., at the Willard Hotel.

The scientific session will include discussions pertaining to oral habits in children, by W. M. Krogman, director of the Philadelphia Center for Research in Child Growth; Maury Massler of Chicago; I. N. Kugelmass, New York pediatrician; and J. A. Salzmann of New York. Moderator will be Russell A. Dixon of Washington, dean of Howard University dental school.

The program will also include table clinics by 21 outstanding pedodontists, it is announced, and a panel discussion on community dental program planning for children. Participants in the panel discussion will be Allen O. Gruebbel, secretary of the Council on Dental Health of the Association; Walter J. Pelton of Washington, chief of the Division of Dental Resources, U.S. Public Health Service; L. Snedeker, assistant director of the Children's Hospital, Boston; J. M. Wisan of New York; and C. V. Rault, dean of Georgetown University dental school.

Further details may be obtained by writing to the secretary-treasurer, Hugh Keenan, Keenan-English Building, Corning, N.Y.

BUNTING MADE FCDA HEALTH DIVISION DENTAL CONSULTANT

Russell W. Bunting of Ann Arbor, dean emeritus of the University of Michigan dental school, has been appointed consultant on dentistry to the Health and Special Weapons Division of the Federal Civil Defense Administration in Washington, D.C., it is reported by Millard Caldwell, civil defense administrator. He assumed his new position on July 1.

ALPHA OMEGA ASKS MEMBERS TO AID MAILING LIST REVISION

Alpha Omega fraternity has requested the assistance of its members in the revision of its mailing list. Any member of the fraternity not receiving its literature is requested to send his name, address, undergraduate chapter, and year of graduation, to the national headquarters office, 41 East 19th Street, New York 3, for the attention of H. Sedran, secretary.

The Reader Comments

AN EVALUATION OF THE EFFECT OF DENTAL FOCI OF INFECTION ON HEALTH

The exhaustive evaluation and summary of scientific information concerning the role of dental foci of infection in systemic disease published in the June 1951 issue of THE JOURNAL stimulated a number of comments from interested readers, a few of which are published here.

I have read with great admiration and appreciation the section, "Pituitary-adrenal mechanism and disease," which begins on page 687 of the June issue of THE JOURNAL.

I would like very much to have a reprint of this excellent article and would deeply appreciate your supplying me with one if it can be spared.

(Mrs.) Eleanor E. Buckley
Medical Department, Wyeth, Inc.
Philadelphia

I have just completed reading the June issue of THE JOURNAL and I want to compliment you and those associated with you in preparing the papers on dental focal infection. It is an excellent evaluation, as critical and dispassionate as a study of this kind can be. All of you, including the editor of THE JOURNAL, have done a great service to dentistry in preparing and publishing the papers and so helping to clear up many questions of interest to the dentist, physician and layman alike.

Louis I. Grossman, D.D.S., Philadelphia

I have read the several sections on the foci of infection and heart disease and found them most competently handled. This information will be of real assistance to us in our professional educational program. Would it be possible for you to send me three additional copies to send to a few of our Board members who are particularly concerned with the mutual problems of the dentist and the physician in the heart disease field?

John W. Ferree, M.D.,
Director of Public Health,
American Heart Association Inc., N.Y.

I hasten to write you about the June issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION dealing with the effect of dental foci of infection on health. This is very interesting to me for I never could accept Billings' findings and charges as explicitly as he made them. I have always said to people: "We should extract teeth from a dental standpoint only."

John E. Gurley, D.D.S., San Francisco

Congratulations on the June issue of THE JOURNAL, one of the best, and in some ways *the* best issue ever published.

Howard R. Raper, D.D.S.,
Albuquerque, N.M.

Congratulations on the wonderful job you did with the June issue of THE JOURNAL. Let's have more of the same.

Leonard Szerlip, D.D.S.,
Morristown, N.J.

"An Evaluation of the Effect of Dental Foci of Infection on Health"—projected by the American Dental Association Council on Dental Health, written by Easlick, endorsed by Editor Morrey, and an entire issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION dedicated to it.

In spite of the evident utter ignorance in oral-systemic clinical experience, and in spite of this mammoth attempt to relegate dentistry to the role of a trade; in my opinion oral pathologic processes will continue to cause or contribute to systemic manifestations, dental clinical practitioners will continue in their sincere efforts to improve the over-all general health of people, and they will progressively enhance dentistry's position in this honored profession of the healing arts.

Donald L. Truscott, D.D.S.,
St. Petersburg, Fla.

Book Reviews

HISTORY AND PHILOSOPHY OF MEDICINE

By John Farquhar Fulton, M.D., Ph.D., D.Sc., LL.D. First edition. 52 pages. Index. Price $1. Lawrence, Kan., University of Kansas Press, 1950.

Two contributions are contained in this first publication of the Logan Clendening lectures on the history and philosophy of medicine. The first deals with Vesalius and the second with medicine in the 18th century.

In his introduction to the review of Vesalius' work, Fulton emphasizes the interest Clendening had in medical history and expresses gratitude for the extensive collection of historical items donated to Yale University by the Clendenings. Vesalius' colorful life then is presented in considerable detail. The essay concludes with consideration of the three publications for which Vesalius is so well known four centuries later, the *tabulae sex*, the *Fabrica*, and the *Epitome*, and the lasting influence they have had on anatomy and medicine.

More extensive in its treatment, the second lecture deals with 18th century personalities who made significant scientific investigations in the fields of physiology, pathology and internal medicine. In the first classification are Stephen Hale, whose pioneer studies of blood pressure are described in detail, Priestley and Lavoisier. Under pathology, Morgagni is discussed. Those considered under internal medicine are Boerhaave, Withering and Jenner.

The lectures offer pleasant relaxation as well as instructive information about early developments in medicine.

William W. Bolton

THE 1950 YEAR BOOK OF DENTISTRY

Edited by Stanley D. Tylman, Donald A. Keyes, John W. Knutson, George R. Moore, Hamilton B. G. Robinson and Carl W. Waldron. 525 pages with 384 illustrations. Index. Price $5. Chicago, The Year Book Publishers, Inc., 1950.

The 1950 edition of *The Year Book of Dentistry* is edited by the same expert panel of six responsible for the preparation of the 1949 volume. As in the previous issue, the following divisions of the dental field are covered: caries; public health; dentistry for children; orthodontics; surgery and related pathology, and restorative and prosthetic dentistry. A section on diagnosis, including x-ray, and laboratory and clinical technics; and a section on pulp and periodontal disease and related pathology have been added. The section on roentgenotherapy, previously carried, is omitted.

Selections are made from dental periodicals published in the United States and abroad, with some coverage given to dental material appearing in medical journals and those of allied fields. Editorial comment appears at the end of many of the abstracts.

The book is compact and easily handled, with profuse illustrations and an alphabetical index for both subject and author. Like previous issues it furnishes a comprehensive résumé of dental periodical literature for the year covered, in this instance from August 1949 to August 1950.

Martha Ann Mann

HANDBOOK OF ANTIBIOTICS

By A. L. Baron. First edition. 303 pages. Index. Price $6.50. New York, Reinhold Publishing Corp., 1950.

This handbook includes an accumulation of published data on 141 antibiotics in an organized, factual and concise form. The material relates directly to the subject of antibiotics themselves; for example, their production, chemistry, toxicology, pharmacology and bacteriology. The application of antibiotics in applied or theoretical fields is briefly acknowledged and listed in the bibliography.

Chapters by Henry Welch on "Certification of Antibiotics" and Walter J. Derenberg on "Registration of Trade-Marks of Antibiotics," are included. The book also includes a glossary and a list of antibiotic producing organisms.

In an effort to keep the book balanced, the author covers penicillin and streptomycin in an abbreviated form and references to textbooks make up the bibliography for these substances.

This book is not intended for clinicians interested solely in the therapeutic phases of antibiotics, but it should be included in medical and dental school libraries. The research investigator and others interested in the broad field of antibiotics should find this book a valuable addition to their libraries.

Holmes T. Knighton

DIGESTO DE SALUD PUBLICA (DIGEST OF PUBLIC HEALTH.) VOL. 1.

Ministerio de Salud Pública de la Nación. Sección Publicaciones. 528 pages. Index. Buenos Aires, Argentina, 1950.

This is the first of a three volume series being prepared by the Ministry of Public Health of Argentina under the direction of Dr. Ramón Carrillo, Minister of Health, who explains, in the introductory pages, the need for a complete recapitulation and reorganization of public health laws which existed upon his assumption of his present post.

The current volume reviews all legal procedures with public health aspects during the 58 years from the creation of the National Department of Hygiene, October, 1891, to the establishment of the present Ministry of Public Health under the Argentine Constitution, March 11, 1949.

The text of the national Constitution precedes the 19 sections of the book which includes a chapter on the various Ministries of the country, a section on the Ministry of Health, the Sanitary Code, international regulations on sanitation, legal aspects of general and psychiatric hospitals, a chapter on dentistry, several sections on pharmacy and prescription regulations, and the Argentine official pharmacopeia.

There is a comprehensive alphabetical, classified index, which should enable those familiar with the subject and the procedures of the country to locate material with ease. The entire text is in Spanish.

Martha Ann Mann

PENICILLIN AND STREPTOMYCIN IN THE TREATMENT OF INFECTIONS

By Chester S. Keefer, M.S., M.D., Sc.D., and Donald G. Anderson, M.D. Second edition. 109 pages. Index. Price $2.50. New York, Oxford University Press, 1950.

This book is reprinted from the *Oxford Loose-Leaf Medicine* with the same page numbers as in that work. It concerns itself entirely with penicillin and streptomycin with no mention of the newer antibiotics now in use. However, as stated in the preface, the practitioner who has learned effectively to use penicillin and streptomycin will be basically prepared to use the other antibiotics.

The book is obviously written for the physician with very little reference to dental uses of these drugs. Very brief mention is made of the use of penicillin prophylactically before tooth extraction for the control of bacteremias as well as its use in the treatment of Vincent's disease. Both of these discussions are entirely inadequate to serve as a guide to the clinician. Dentists will be interested in the statement found on page 247, "It [penicillin] has caused sensitization following its use in tooth paste." No mention is made of dental uses of streptomycin but this is understandable since, in this reviewer's opinion, the only possible rational use of streptomycin in dentistry should be its occasional topical use in combination with other antibiotics for the treatment of root canal and periapical infections.

On the other hand, the book gives a very accurate and concise, but still complete, account of the basic pharmacology and clinical applications in medicine of these two antibiotics. For the teacher of dental pharmacology and therapeutics and the oral surgeon who is frequently treating serious infections in and about the mouth, the book will have value as a source of basic information. For the general practitioner of dentistry its value will be limited because of the paucity of information on clinical applications in dentistry.

F. D. Ostrander

STRONG-CARTER DENTAL CLINIC: THIRTIETH ANNUAL REPORT

40 pages with 13 illustrations, 15 tables and 4 graphs. Honolulu, Hawaii, Palama Settlement, 1950.

This is an excellently prepared report of the Strong-Carter Dental Clinic of Hawaii. It is well illustrated, printed on a good grade of paper, and is interesting and informative reading. The format is good.

As far as the content goes, it is not within our province as reviewer to delve too deeply into the details of the clinic and its accomplishments. However, it would be an injustice not to call attention to the consistent lowering of the number of permanent teeth extracted, as this is rather universally accepted as a partial index of the success of a dental program. Also the number of terminated cases as compared with total enrollment is most favorable and might well be taken to heart by some of the clinics here in the United States that show great numbers of patients but avoid indicating the number of cases completed.

In the section devoted to the report of the dental health education work, it was most gratifying to find that 61 per cent of all the Territorial public elementary school children had dental corrective work done by their own dentists, with 44 per cent completed.

H. Shirley Dwyer

PERIODONTIA

By Edgar D. Coolidge, M.S., D.D.S., LL.D., and Maynard K. Hine, M.S., D.D.S. First edition. 318 pages with 378 illustrations, 2 in color. Index. Price $6. Philadelphia, Lea & Febiger, 1951.

This book is based on Coolidge's previous work, *Clinical Pathology and Treatment of the Dental Pulp and Periodontal Tissues,* which enjoyed two previous editions. Recognizing the need for separating these two subjects, the material has been divided into two textbooks called *Endodontia* and *Periodontia.* In the textbook under consideration, M. K. Hine is the coauthor. Although the general plan remains unchanged, some additional text with many excellent illustrations has been added.

The object of this book, as indicated in the preface, is to provide a text that will be helpful in the study of the problems involved in the treatment of periodontal diseases. This formidable task has been accomplished with noteworthy success. This is a scholarly treatise, well documented and illustrated. It contains 13 chapters. The chapter titles are arranged according to broad subject classifications, but a detailed subject index makes it possible for one to easily locate specific items. Each chapter is accompanied by a carefully selected bibliography. A complete bibliographic index is also included.

The authors have made many original contributions to our present knowledge of periodontia. Their extensive experience is reflected in the comprehensive and lucid discussion of the many facets of the periodontal problem and the elimination of useless and unconfirmed data. They have compiled material presenting the knowledge essential for a rational and effective approach to the control and cure of periodontal diseases. The book is replete with practical clinical instructions on most of the major disorders encountered in this field. The directions given for the management of the common complications of periodontal disorders, although brief, are full enough to inform the reader of exactly what to do under this or that circumstance. The procedures recommended are in keeping with the best modern practice and include discussions of many recent developments.

The book can be highly recommended as a textbook for students and as a reference volume for those interested in the principles and practice of periodontia.

E. Alan Lieban

SOCIAL SECURITY 1950 EXPLAINED

By Commerce Clearing House, Inc. 1,281 pages with 6 charts. Index. Price $1. Chicago, Commerce Clearing House, 1950.

Commerce Clearing House periodically publishes pamphlet explanations of new Federal laws, or new amendments to existing laws, which will vitally affect large or important segments of the nation's population. Business interests and labor groups, especially, cannot help but benefit from this type of intensive explanation of the certain and possible effects on their activities inherent in a particular Federal law. Seldom, however, would the average individual be sufficiently affected by a Federal law to benefit from this service; an exception is the Social Security Act and particularly its provisions for Old Age and Survivors' Insurance benefits.

Social Security 1950 Explained can furnish the reader with an adequate understanding of the retirement and death benefits under the insurance program. Those who before 1950 were qualifying for or receiving benefits will discover how those benefits have increased. Some who did not qualify previously will find that today they are eligible. Others who are nearing the age of sixty-five and who remain unqualified because of the nature of their occupations or activities (among them dentists) will discover that a relatively short period of employment in a qualified occupation will render them eligible. Finally, those presently ineligible will at least perceive that the trend is toward including more activities within the scope of covered employment and that within a few years, perhaps, they may become qualified for benefits.

The pamphlet treats Old Age and Survivors' Insurance benefits most thoroughly. The changes effected by the amendments are illustrated by specific examples portraying their application in a variety of circumstances and their effects in comparison with the old law. The provisions which remain unchanged are similarly explained.

The treatise, however, cannot be digested easily. No law as complex as the Social Security Act can be compressed into a brief and simple handbook. But anyone interested in becoming thoroughly enlightened in the way in which Old Age and Survivors' Insurance operates can achieve that goal if he will devote a few hours to an earnest reading of *Social Security 1950 Explained.*

Current Literature

JOURNAL OF DENTAL RESEARCH
April 1951

EXPERIMENTAL STUDIES IN VIVO ON THE PERMEABILITY OF ENAMEL WITH PARTICULAR REGARD TO THE EFFECT OF SUGAR SOLUTIONS

Helge Berggren and Harry Hedström, p. 161.

It has been shown previously that tetanus toxin is capable of penetrating the enamel of dog teeth in amounts sufficiently large to be detected by biologic test only when mixed with a glucose solution. The present experiments were performed on dogs principally to investigate (1) the relation between glucose concentration and toxin penetration and (2) the influence of fructose upon the toxin penetration. The canine teeth were exposed to tetanus toxin and glucose of different concentrations on the left and right sides of the mouth—to toxin-fructose on the left and toxin-glucose on the right. The time of action of the toxin-sugar mixture was from 2 to 45 hours. After the dogs were sacrificed, the pulp tissue of the exposed teeth was ground up in mortars with a little saline, the teeth from the right and left side separately. Pulp suspensions were prepared and injected in mice of which half were first immunized with tetanus antitoxin. If the nonimmunized mice died or developed symptoms of tetanus, and the ones protected by serum were symptom free, it was considered as evidence of penetration of the toxin through the dental hard tissues. It was established that there is definite relation between glucose concentration and toxin penetration, and that fructose will increase the penetration of tetanus toxin to a higher degree than glucose.

THE INFLUENCE OF TOPICALLY APPLIED FLUORINE ON THE PERMEABILITY OF ENAMEL

Helge Berggren and Harry Hedström, p. 169.

To test the effect of topical fluorine application on the permeability of the enamel of dogs, experiments were carried out on 16 animals. A 2 to 4 per cent sodium fluoride solution was applied to the canine teeth on one side of the mouth. The canine teeth on the other side were untreated and served as controls. The teeth were then exposed for 38 to 44 hours to a toxin-fructose mixture, where the toxin titer was 1:100,000 and the fructose concentration 20 per cent. The penetration of toxin through the dental hard tissues was established by its presence in the pulp. The pulp tissue from teeth treated with fluorine and from untreated teeth was ground up separately in mortars after addition of a little saline, and suspensions were prepared. The suspensions were injected in 8 mice, 4 of which were first immunized with tetanus antitoxin. All the nonimmunized mice died showing symptoms of tetanus. It was established that the permeability of the enamel was unchanged by treating the teeth with fluorine.

FLUORINE IN HUMAN TEETH STUDIED IN RELATION TO FLUORINE IN THE DRINKING WATER

F. J. McClure and R. C. Likins, p. 172.

The teeth of individuals continuously exposed to drinking water containing 0.0 to 0.3 ppm fluorine may be expected to contain approximately 0.0100 per cent fluorine in the enamel and 0.0240 per cent fluorine in the dentin. A near dental-optimal quantity of fluorine in the drinking water in Aurora, Ill. (that is, 1.1 to 1.2 ppm) resulted in 0.0133 per cent fluorine in the enamel and 0.0385 per cent fluorine in the dentin. These additional quantities of fluorine in dentin and enamel are associated with a marked reduction in dental caries experience, but dental fluorosis is not an endemic health problem among such teeth. Data are presented to show the effect of other higher levels of fluorine in drinking water on the fluorine in human dentin and enamel.

THE SOLUBILITY OF NORMAL AND FLUORIDIZED ENAMEL

Philip H. Suess and L. S. Fosdick, p. 177.

It has been demonstrated that the topical application of a sodium fluoride solution to the tooth surface will impart a resistance to dental caries to the tooth. It has been postulated that the effects may be due to a decreased solubility of the tooth toward acids or to an interference with the enzyme systems responsible for the production of acids.

The present study is an attempt to show how much protection the tooth may gain on the basis of decreased solubility. It was found that fluoridized enamel would decalcify at pH 4.7 at the same rate as that of normal

enamel at pH 5.2. Insofar as the tooth surface of mildly carious active individuals seldom reaches an acid potential of pH 4.7 it is suggested that this degree of protection is sufficient to explain the clinical results that have been observed. It also suggests that individuals suffering from rampant caries would derive little benefit from fluoride treatment.

INVESTIGATIONS ON THE METABOLISM OF FLUORIDE. I. THE DETERMINATION OF FLUORIDE IN BLOOD

Frank A. Smith and Dwight E. Gardner, p. 182.

A description is given of the application of standard double distillation procedures, using first concentrated sulfuric acid, then concentrated perchloric acid, to the determination of fluoride in blood. A statistical evaluation of the accuracy and precision of the method is also given. Blood fluoride concentrations in normal dogs and rabbits are found to be comparable, and in general, to be less than 10 μg of fluoride per 100 milliliters of blood.

AN EVALUATION OF VARIOUS TECHNICS FOR REDUCING DECALCIFICATION OF ENAMEL. II. IN MATCHED ENAMEL-DENTIN FRAGMENTS

Hubert B. Palmer, Susie Overstreet and Marilyn Sacks, p. 189.

Four hundred and eight matched enamel-dentin fragments representing 102 extracted noncarious molar teeth from 81 adults were thoroughly cleaned and divided into 25 groups. The enamel surfaces of fragments in experimental groups were treated with test solutions for 35 minutes. All fragments were maintained in glucose-serum broth seeded with culture of *Lactobacillus acidophilus* at 37 degrees C. for 30 days. Technics utilizing either an acidulated fluoride solution, a 2 per cent sodium fluoride solution, or Zin-Ferro-Nitrate solution reduced decalcification of enamel *in vitro* 31.69 per cent, 25.45 per cent, and 9.79 per cent, respectively.

AN EVALUATION OF VARIOUS TECHNICS FOR REDUCING DECALCIFICATION OF ENAMEL. III. A PROGRESSIVE STUDY OF DECALCIFICATION

Hubert B. Palmer, Susie Overstreet and Marilyn Sacks, p. 195.

Extracted, erupted, noncarious molar teeth, representing 181 adults, were thoroughly cleaned and divided into groups. Both whole teeth and tooth fragments were treated with various testing solutions and maintained in glucose-serum broth seeded with culture of *Lactobacillus acidophilus* at 37 degrees C. for different periods of time. The acidulated fluoride solution, the 2 per cent sodium fluoride solution and the Zin-Ferro-Nitrate solution as applied both to nondecalcified teeth and enamel-dentin fragments, became progressively less effective for reducing decalcification of enamel when the teeth or fragments were under prolonged exposure to *L. acidophilus*. The application of the 2 per cent sodium fluoride solution to both decalcified teeth and enamel-dentin fragments reduced further decalcification of enamel as effectively as when applied to either nondecalcified teeth or to nondecalcified enamel-dentin fragments.

THE TOXICITY OF IODOACETIC ACID AND ITS QUANTITATIVE RELATIONS TO INHIBITION OF GLYCOLYSIS AND DENTAL CARIES

Claes Lundqvist, p. 203.

The inhibition of glycolysis by iodoacetic acid (I-ac) in *in vitro* saliva-glucose-enamel tests was compared with the *in vivo* effect on caries during 100 days in 114 albino rats. *In vitro* tests show 10 times the inhibitory effect demonstrated by animal tests. A distinct caries inhibition is obtained with a concentration of 0.002 per cent I-ac in the Hoppert-Webber-Canniff diet.

The LD_{50} in peroral administration of I-ac in rats is calculated to be 116 ± 13 mg. per kilogram of bodyweight.

The safety margin of I-ac is too narrow to permit its use as a caries prophylactic although toxic changes were not found in the caries groups. The experiment confirms the applicability of the principle of supplementing a caries-producing diet with compounds having local action on enzyme systems.

TOXICITY TRIALS WITH CETYLAMINE

J. Malcolm, Eileen Mary Deaker and Muriel Emma Bell, p. 214.

Rats fed on a complete diet and each ingesting a paraffin solution containing 0.0011 Gm. cetylamine daily for periods up to nine months showed no toxic effects as judged by histologic examinations and urinalysis. The amounts administered surpass by far the equivalent quantities that might be swallowed if cetylamine were used to form a protective layer on human teeth.

THE PROTECTION OF THE WET ENAMEL SURFACE BY ADSORBED FILMS

R. W. Green and J. P. Walsh, p. 218.

Aliphatic primary amines with a chain length of from 12 to 18 carbon atoms are adsorbed on the wet enamel surface to form a film which strongly inhibits the destructive effect of acids *in vitro*. The protective influence, which is exerted by both aqueous and oily solutions, reaches a maximum with tetradecylamine. A solution of this amine in medicinal paraffin oil is suggested as most suitable for a clinical investigation. It is shown that the action of aliphatic amines on enamel results from an affinity between the amino group and the calcium phosphate.

THE PREVENTIVE ROLE OF FLUORINE AGAINST CARIES

Themis Mavrogordato, p. 225.

OXIDATION OF GLUCOSE DEGRADATION PRODUCTS IN THE PRESENCE OF SALIVA AND POSSIBLE RELATION TO CARIES IMMUNITY

J. C. Calandra and Ernest C. Adams, Jr., p. 229.

SOME PHYSICOCHEMICAL FACTORS IN RELATION TO THE CAUSATION OF INTERPROXIMAL CARIES

R. B. Nevin and J. P. Walsh, p. 235.

Clinical surveys suggest a relation between the shape, contact areas, and separation of the teeth and the incidence of interproximal caries. The present study demonstrates the pronounced effect of spacing and contact area on the rate of diffusion of hydrogen ions from between closely approximating curved and flattened surfaces of pairs of Pyrex glass rods with acid contained between them, when immersed in solutions whose buffer capacities cover the range recorded for human saliva. pH measurements were taken by a quinhydrone electrode. Altering the separation between surfaces of uniform curvature from 0.07 mm. to 0.14 mm. produced the same increased rate of diffusion (X3) as a ninefold increase of buffer capacity. Halving the depth (2.25 mm.) of the contact area between flattened surfaces separated by 0.14 mm. increased the rate of diffusion nearly five times. Variation in buffer capacity above the average value for saliva did not produce any significant effects. It is concluded that the results demonstrate a physical basis for the much greater caries susceptibility of the distal surfaces of the first deciduous molars and permanent bicuspids as compared with the mesial surfaces where the contact areas are considerably smaller. The findings are consistent with the theory that acid decalcification of the enamel surface is the initial lesion of interproximal caries.

OBSERVATIONS ON SALIVARY LACTOBACILLUS COUNTS FOR A PERIOD BEFORE AND AFTER TOPICAL APPLICATIONS OF TWO PER CENT SODIUM FLUORIDE

Paul C. Kitchin, Hamilton B. G. Robinson, Dorothy Permar and Andrew W. Imhoff, p. 251.

A total of 77 children, aged 7 to 9 and 14 to 16 years, were divided into experimental and control groups. Each child in the experimental groups received four topical applications of 2 per cent sodium fluoride, the first preceded by an oral prophylaxis. Those in the control group received only an oral prophylaxis. Salivary lactobacillus counts were taken before, and at intervals after, the treatments for one year for the 14 to 16 year age group, and for two years for the 7 to 9 year age group. The counts showed no consistent differences. No changes were observed in the salivary lactobacillus counts of the experimental group that were not equally true of the control groups.

A STUDY OF THE EXFOLIATIVE CYTOLOGY OF ORAL LEUCOPLAKIA

Paul W. Montgomery and E. Von Haam, p. 260.

THE EFFECTS OF DENERVATION AND ISCHEMIA UPON THE TEETH OF THE MONKEY

Earl O. Butcher and A. Cecil Taylor, p. 265.

The inferior alveolar nerve was resected at the mandibular foramen and its proximal stump sutured to the fascia or the muscle to prevent its regeneration into the mandibular canal. This operation did not affect either the rate of tooth eruption, the appearance of the gingiva, the hardness of the dentin and enamel, or the incidence of caries.

By running rubber bands through small holes near the incisal borders of the lower central incisors and attaching their ends to a wire passed circumferentially around the mandible at the symphysis, incisors with wide apical foramina were retracted into their sockets

with sufficient force to accomplish complete ischemia, degeneration of the odontoblasts and much of the pulp. Upon release, the latter was replaced from compressed tissue at the apex. Following apicoectomy, invasion of the pulp cavity with connective tissue occurred. No odontoblasts regenerated but osteoid tissue was deposited, surrounded by osteoblasts. Tissues possessing odontoblastic and dentin-forming potentialities appeared to be quite specialized and restricted to an area at the apex.

MODIFICATIONS OF MANDIBULAR ARCHITECTURE FOLLOWING REMOVAL OF TEMPORALIS MUSCLE IN THE RAT

Sidney L. Horowitz and Harry H. Shapiro, p. 276.

Unilateral removal of the temporalis muscle in a number of 1 month old Sherman strain rats produced modifications of the outer form and internal architecture of the mandible. Gross examination of the operated animals showed no evidence of the coronoid process or the linea temporalis on the operated side. These findings are in agreement with those of Washburn, whose experiment was carried out on newborn rats.

Grenz ray examination revealed modifications of internal mandibular architecture of the operated side consistent with loss of functional stimuli. The trabeculation pattern showed alterations as compared with the control mandible. The form and direction of the head and neck of the mandibular condyle were modified.

DIMENSIONAL CHANGE OF AGAR-AGAR GEL ON IMMERSION IN VARIOUS SULFATE SOLUTIONS

E. A. Luster, p. 281.

Inasmuch as there is a definite volumetric change in agar-agar gels with time and conditions (shrinkage in air, swelling in water) it has been the custom in dental offices to immerse an impression in a 2 per cent solution of potassium sulfate. It has been claimed that this solution will stabilize the agar gel against dimensional changes.

A test method which yields empirical figures on expansion or contraction is described with equipment. Using a 5 per cent agar gel, the dimensional change throughout a time range from immediate pouring to 12 hours was measured. The following conditions were tested: (1) exposure to air, (2) immersion in water, (3) immersion in 2 per cent potassium sulfate, (4) immersion in various concentrations of potassium sulfate, and (5) immersion in 2 per cent solutions of sulfates of nickel, sodium, ferrum, manganese, magnesium, aluminum, cobalt and aluminum potassium.

Aluminum potassium sulfate gave the most stabilizing effect, and indicates the possibility of finding solutions satisfactory for each brand of reversible hydrocolloid impression material available to dentists.

A COMPARISON OF THE TENSILE AND BENDING PROPERTIES OF DENTAL GOLD WIRES

D. F. Taylor and F. A. Peyton, p. 290.

In modern dental practice precious metal alloy wires are used as partial denture clasps and orthodontic appliances. In such appliances these wires are subject only to bending and never to pure tensile loading. The purpose of this investigation was to determine if any correlation existed between the mechanical properties of gold wires when tested in tension and in bending. It is believed that the bend test more nearly approaches actual conditions under which the wires are used than does the tensile test.

The properties determined in this study were modulus of elasticity and proportional limit in bending; the modulus of elasticity, proportional limit and ultimate strength in tension. Wires of 0.040 inches in diameter were tested in the softened and hardened conditions. A definite correlation between the results of tests in tension and bending was found. Values for the proportional limit were consistently higher in bending than in tension. The values for modulus of elasticity were comparable by either method of test, with only slightly higher values obtained by the bend method.

OSTEOMYELITIS OF THE MAXILLA AND MANDIBLE

Hamilton R. Young. Mil. Surgeon 107: 456, December, 1950.

There has been a noticeable decrease during the last five years in the number of cases of osteomyelitis of the maxilla and mandible because of chemotherapy with sulfonamide and penicillin. However, it is still an oral manifestation with which a practitioner may be confronted.

The most frequent causes of osteomyelitis are odontogenous in origin. The principal etiological factors are chronic dental infections, any dental surgery operation, low resistance, use of local anesthesia through in-

fected areas, the invasion of pathogenic organisms and lesions of the soft tissues. Other causes are trauma, gun shot wounds, infectious diseases, and occupational exposure to mercury, arsenic, lead and phosphorus. The treatment calls for clear understanding of the case, both medically and surgically. During the first 24 to 72 hours, attempts to abort the infection can be made by use of ice bags, chemotherapy and general supportive treatment. A change from cold to heat application is preferable if pain and swelling persist and there is a tendency for infection to spread to the soft tissues and point. Upon localizing the inflammation, incision and draining may be done.

In order to get adequate drainage in the virulent type of infection of osteomyelitis it is usually necessary to employ extraoral incision, although sometimes intraoral drainage is sufficient. Occasionally a combination of both is employed. Following surgical treatment of acute osteomyelitis and the aid of supporting measures, the acute stages subside and the condition changes to low grade infection. Necrosed bone is sequestrating and the sequestra should never be removed until after the process is complete. It is of vital importance to employ conservative treatment. Some of the complications are pathologic fractures, toxemia and extension of infection into the deep tissues of the neck.

Chronic osteomyelitis usually follows the acute form, or in some instances it may be chronic from the beginning. Etiologically it is the same as the acute, but the systemic condition of the patient, the condition of the affected area, pain, swelling and suppurative inflammation, are not so severe. Surgical procedures and treatment of chronic osteomyelitis are practically the same as for the acute form.

Charlie A. Ammons

TIME TO BEGIN ORTHODONTIC TREATMENT

Aldo A. Battiste. Am. J. Orthodont. 37: 98, February, 1951.

Determining the proper time to institute orthodontic treatment is one of the most perplexing problems that confronts the orthodontist. A review is presented of the literature on the subject which expresses the views and ideas of those who, through experience or scientific investigation, have contributed basic criteria by which we can determine the time to begin orthodontic treatment.

Most of the authors agree that treatment in the primary dentition should be limited to those conditions which prevent the continued development of normal occlusion and which will obviously not correct themselves. Among those conditions which indicate that treatment is needed during this stage are extreme distoclusions, almost all mesioclusions and posterior and anterior cross-bites.

Concerning treatment in the mixed dentition, opinion varies greatly. Some consider this the most advantageous time for treatment; others feel that there are almost no indications for treatment during this stage.

The general consensus of opinion seems to indicate that only mesioclusions, extreme distoclusions, and cross-bites (anterior or posterior) should be treated during the time of the mixed dentition. In some cases, the deciduous cuspids may be extracted to relieve crowding of the permanent incisors. Following this procedure, a preventive lingual arch wire should be placed.

Occipital anchorage may be utilized to advantage in treating Class II, Division 1 malocclusions in mixed dentitions.

With a few exceptions, the period immediately following the eruption of the permanent second molars is the period during which most orthodontic treatment should be initiated. At this time the full volume of tooth substance is present, the individual growth pattern is well established and there are sufficient teeth to receive nearly any type of appliance.

William F. Ford

ROENTGENOGRAMS FOR CHILDREN

Alvin F. Gardner, D.D.S. J. Canad. D.A. 16:9, January, 1950.

Full mouth roentgenograms for the developing child are a valuable oral diagnostic aid when used as an adjunct to a thorough clinical examination. There is no other single factor that can impart so much valuable information when used to supplement other methods of examination. When considered without other clinical factors, however, they are practically useless.

In addition to the full mouth periapical views, I prefer two lateral view roentgenograms, one for each side. The bitewing, occlusal view, and anteroposterior views are frequently of value and should be taken in some instances. Carpal radiograms for the child are another important diagnostic aid to determine the normal bone growth and development of the child's skeletal structures.

Practical uses of the roentgenogram for children are as an aid in the diagnosis of dental caries in deciduous and young permanent

teeth; or in determining the presence of fractured deciduous or young permanent teeth after traumatic injury, the variation and condition of the osseous structure in children and the condition of the pulp and root in fractured young anterior incisor crowns; also in determining the presence of retained deciduous roots and tooth fragments, the degree and conditions of malformation of the young permanent teeth, the incarceration of deciduous and young permanent teeth, the presence of pathologic pressure resorption of deciduous or permanent teeth, and the position and location of unerupted teeth.

Bitewing films are an aid in determining the presence of small interproximal caries as well as recurrent caries under restorations. Occlusal roentgenograms are an aid in the diagnosis of oral conditions when correlated with the periapical and bitewing examinations. This view will aid in the localization of embedded roots or impacted teeth in both the maxillary and mandibular arch. Lateral view or head roentgenograms are of value for children as they show the angle and ramus of the mandible, and they are valuable before oral surgical procedures upon children. Carpal roentgenograms are an aid in determining the degree of skeletal maturation in children.

Alvin F. Gardner

THE BOTTOM OF THE PATHOLOGIC CREVICE

A. B. Riffle. J. Periodont. 21:78, April, 1950.

The clinical experience of the author has failed to reveal pocket formation of the inverted funnel shape referred to in the literature. The clinging periodontal fibers of 478 extracted teeth (routine extractions from the offices of 3 oral surgeons) were studied in regard to location and pattern attachment. Recordings to the nearest 0.5 mm. were made of the distance from the cemento-enamel junction to the line of clinging attached fibers and from the cemento-enamel junction to the apex on each root surface. These were then rearranged according to age and according to the depth of the pathological crevice. The deepest crevice classification was considered the classification for the entire tooth. Loss of periodontal fiber attachment was found in 73 per cent of the teeth in the age group 16 to 25, 94 per cent had loss in the age group 26 to 35, 98 per cent in the group 36 to 50 and 99 per cent in the group over 50. The average site of attachment for the fibers was 1.6 mm. apical to the cemento-enamel junction on the buccal and proximal surface in the 16 to 25 year group. The lingual attachment was 1.4 mm. apical to the junction. In the 26 to 35 year group the loss of attachment had progressed an average of 0.8 mm. with an arching of the attachment on the proximal surfaces following the arching of the cemento-enamel junction. The average loss of attachment in the 36 to 50 year group is increased by 2 mm. After 50 years of age, detachment of tissue takes place less rapidly; an average of only another 1 mm. increase.

Variations in the crevice depth were not great. Seventy-five per cent had variations of 2 mm. or less, 88 per cent had variations of 3 mm. or less, and only 6 per cent had variations of 5 mm. or over.

The most common pattern made by the clinging fibers was one in which the fibers on the buccal surface, lingual surface or both were apical to those on other surfaces (47 per cent). A modification of this found the fibers parallel to the cemento-enamel junction all around the tooth (40 per cent). Another variation showed the crevice depth to be greater on one proximal surface than the other (13 per cent). Only 3 per cent showed a "dipping" of the fibers toward the apex on the proximal surfaces. Deep losses of fiber attachment were never found on proximal surfaces alone.

Thus it can be concluded that there are (1) progressively increasing depth of the pathologic crevice with increasing age, most marked between 35 to 50 years of age; (2) incidence of loss of the periodontal fiber attachment beyond the cemento-enamel junction in 73 per cent of teeth before 25 years of age and 94 per cent by 35 years; (3) usually deeper pathologic crevices on the buccal and lingual than on the proximal surfaces, and (4) no deep narrow funnel shaped crevices whose bases are variable in relation to the pocket opening.

William A. Peterson

THE TREATMENT OF TEETH WITH EXPOSED HEALTHY PULPS

Walter Hess. Internat. D. J. 1:10, December, 1950.

In a cavity preparation where there is a thin discolored layer of dentin above a healthy pulp, the pulp may be indirectly capped with agents like Calxyl, 10 per cent aqueous solution of silver nitrate with zinc oxide-eugenol or 10 per cent aqueous solution of silver nitrate precipitated by calcium chloride in saturated solution, and the cavity subsequently sealed with phosphate cement. This method of prophylaxis lacks sufficient scientific foundation. A pulp indirectly capped should be kept under observation for a prolonged period.

Direct pulp capping is the protection of the injured healthy pulp with a biological wound dressing under aseptic conditions so as to give the pulp tissue a suitable environment for repair. The technic consists of careful removal of the carious dentin with sterile hand instruments and exposure of the pulp. Local anesthesia is given, the rubber dam applied and the cavity washed with saturated solution of calcium hydroxide. The wound is dressed with Calxyl, Serocalcium, calcium hydroxide, or Dentinigène without pressure. If there is sufficient access, a small metal cap is laid over the exposure. The cavity is sealed with phosphate cement. In 8 to 10 days the pulp is given thermal and electrical tests. After two to three months roentgenograms may show secondary dentin. A vital functional pulp may be obtained in 85 to 90 per cent of the cases.

Vital amputation of the healthy pulp is based on the same principles as the direct capping of the pulp. If vital amputation is indicated by deep caries following fracture of the crown of the tooth, or in the preparation of bridge abutments for inlays or jacket crowns, and in deciduous teeth, the tooth with a healthy pulp is anesthetized and isolated with rubber dam. The caries is removed, the cavity disinfected with tincture of iodine, the pulp tissue lifted off, and the canal enlarged 1 to 2 mm. below the neck of the tooth. Bleeding is controlled with a saturated calcium hydroxide solution. The pulp stumps are covered with calcium hydroxide, Serocalcium or Dentinigène without pressure, and the surplus water removed with a chloroform pad. The dressing is covered with zinc oxide-eugenol or zinc sulfate cement, and the cavity sealed with phosphate cement. The final filling can be inserted after 6 to 8 days.

James R. Jensen

SPACE CLOSURE IN EXTRACTION CASES

Paul D. Lewis. Am. J. of Orthodont. 36: 172, March, 1950.

The trend today in orthodontics appears to be strongly in favor of the removal of selected teeth in the correction of certain cases. In certain types of malocclusion, after a careful study of the patient, photographs, roentgenograms and casts, it becomes apparent from case analysis that dental units must be removed if stable dentures are to be obtained after orthodontic treatment. The apical base, or bony structure, which holds and supports the roots of the teeth of patients is far too often inadequate. In the types of cases under consideration, treatment attempted without the reduction of tooth units only serves to exaggerate facial disproportion. After a careful survey of the case has been made, it may be decided to remove maxillary and mandibular first bicuspids.

The use of the removable appliance on the maxillary arch facilitates the movement of the cuspids without the necessity for banding any or all of the maxillary teeth. It makes possible, also, the movement of partially erupted or high cuspids into their approximately correct positions when they are not erupted far enough to band.

The coil spring technic on the mandibular arch has an advantage in that the full arch wire is used during the entire treatment. This obviously allows more control of buccolingual position during movement of the cuspids.

It is not claimed that this technic will bring about better results than other methods. However, the pressure on the moving teeth is constant; tooth movement is accomplished with the minimum of irritation and damage to the tissues and with little or no pain or discomfort to the patient.

William F. Ford

THE BIO-PHYSIOLOGICAL PRINCIPLES IN THE CONSTRUCTION OF PARTIAL DENTURES

Anthony Loos. Brit. D. J. 88:61, February 3, 1950.

An analysis of the various stresses of mastication as they apply to abutment teeth and supporting alveolar tissues was made. Emphasis was placed upon the necessity of even distribution of the burden of the partial denture so that damage will not occur to either the supporting teeth or the alveolar tissues.

Pictorial and written descriptions of recommended stress-breaking clasps, and precision attachments were presented.

It was concluded that: (1) Mechanical factors alone must not be the only consideration. Bio-physiological factors must also influence the design of a partial denture. (2) The rigid connection of a free-end partial denture with abutment teeth is contraindicated, because of possible damage to supporting teeth. (3) A totally tissue-borne partial denture will cause rapidly progressive atrophy of the alveolar processes. (4) Abutment teeth and alveolar tissues have a certain capacity to compensate for overstress. Consequently, equal distribution of forces must be obtained by the employment of stress-breaking elements, with strictly limited and controlled resilience.

A. S. Watson

COMPLICATED FRACTURES OF THE MAXILLA

David L. Murphy, E. S. Murphy and W. A. McNichols. J.A.M.A. 145:614, March 3, 1951.

Statistics indicate that motor vehicle accidents are on the increase and as many as 1,200,000 nonfatal vehicle injuries occur in a single year. Skull, brain and nasal damage are given early consideration but deforming fractures of the maxilla are often overlooked, or treatment postponed.

The pertinent points in diagnosis are discussed as well as various methods for realignment and fixation of the fractured and displaced bones of the face. Several case histories are presented, and a discussion of the benefits of external appliance with pin fixation. "The last 94 fractures of the mandible with which we have dealt have all been successfully treated with external fixation."

Each locality should have a group of physicians willing to care for maxillofacial injuries and the ideal group consists of an oral surgeon, an otolaryngologist and a general surgeon; the oral surgeon contributing his knowledge of the alignment of the teeth and the methods of securing a functioning bite. The only reference to the restoration of proper occlusion was in one case report, "The girl's bite is not perfect but it is functional." Three surgeons discussed the paper favorably.

Charles W. Freeman

MEDIAL CLEFT OF THE LOWER LIP AND MANDIBLE: A CASE REPORT

Albert D. Davis. Plast. & Reconst. Surg. 6:62, July, 1950.

Medial clefts involving the lower lip and mandible are so rare that most surgical texts fail to mention this deformity. Only 6 authenticated cases have been reported. In all the cases reported there were other deformities, such as absence of hyoid bone, bifid tongue, congenital heart disease, dense medial cords, and so forth.

A case is reported of a four year old female child who had been operated upon at the age of 1 month. Surgical procedure was instituted at the older age to raise the chin which was held in a position of marked extension and which appeared confluent with the neck with no normal outward thrust. After several weeks, contractures again occurred. Several procedures will be necessary to obtain further correction.

Carlos Weil

ENAMEL EROSIVE PROPERTIES OF FRUITS AND FRUIT JUICES

Carey D. Miller. J. Nutrition 41:63, May 10, 1950.

The effect on rat teeth of the ingestion of grapefruit, mango, pineapple, guava, and the Java plum, and their juices, were studied. For five days rats were fed these materials, to which 10 to 15 per cent sugar was added to increase their palatability. On the sixth day, the rats were killed and the jaws and teeth were studied, using the method of Restarski, Gortner, and McCoy. In all cases, the juices produced greater demonstrable erosion than the corresponding fruit, supporting the postulation that acid fruits have slight erosive effects as compared to the considerable effect of juices made from them. Pineapple juice was the least erosive material and grapefruit juice, guava juice and Java plum juice the most destructive. In each instance the pH and the titratable acidity were determined, but no correlation with erosive properties was found. No adequate control for the sugar added to the test substances was used.

Joseph C. Calandra

ANTERIOR FIXED BRIDGES: A TECHNIQUE FOR CONSTRUCTION BY MEANS OF ONE-PIECE CASTING

John A. Parker. U. S. Armed Forces M.J. 1:881, August, 1950.

One piece cast bridges are stronger, easier to seat and subject the teeth to less torque and save chair and laboratory time. Preparations must be precise and smooth and all grooves parallel. The gingival tissue must be pushed back 2 or 3 mm. from the gingival margin of the preparation to allow for the elastic impression creams. The impression material is mixed with water (40 degrees C.) to allow for slow setting. It is deposited about the preparations by means of a syringe. A tray is filled with remaining impression material and carried to place. The model is poured and trimmed to allow free access to the gingival margin and to receive the necks of the facings. The model is duplicated using cristobalite. Waxing is accomplished on this investment model with blunt instruments so as not to cut it. Facings are ground into position and waxing is completed. The model is sprued from the lingual aspect. The casting is made, and it is finished on the stone model. In the mouth, light polishing with fine disks is all that is required.

Carlos Weil

A PSYCHO-SOMATIC STUDY INTO THE NATURE, PREVENTION, AND TREATMENT OF THUMB SUCKING AND ITS RELATIONSHIP TO DENTAL DEFORMITY

A. G. H. Lawes. D. J. Australia, 22:167 and 211. April and May, 1950.

It is generally accepted that the act of thumbsucking is a potential menace to erupting teeth and developing jaws and a survey of dental literature on the subject proves this beyond reasonable doubt. One of the first actions of the newborn infant is to suck at the mother's breast, and this too is one of the infant's very first pleasures. This sucking is an instinctive act, and a powerful organic pleasure, with which soon is associated a strong sense of security. If the baby is deprived of this companionship which it is beginning to seek, it will be thrown back upon itself as its first outward movements toward social life are baffled. The tendency then is for the infant to find substitute pleasures and satisfaction through sensations of its own body, whereas the thoroughly happy, well adjusted infant will not indulge in such practices. Possible cause of thumbsucking, even among breast-fed babies is the failure to satisfy fully the sucking instinct through over-hasty feeding at the breast. This would result in a sufficiency of food but an insufficiency of sucking movement. Persistence of thumbsucking in an older child may be its way of obtaining attention from its mother.

If we accept the contention that sucking is a purely instinctive process, then this dictum disposes of the hope of checking or breaking the thumbsucking habit by the use of mechanical obstacles such as elbow splints, sticking plaster, mittens and the like. This explains how it is that children can be subjected to these restrictive procedures for long periods of time without success.

It has been shown that dairy cattle which are normally weaned from their mothers at birth and are fed from a bucket invariably turn to substitute sucking, whereas the calves of beef cattle, which remain with their mothers and suckle for 6 or 7 months unhindered, do not. In the one case the instinctive sucking urge is completely frustrated and in the other it is fully satisfied.

The act of sucking at the mother's breast is the very core of the young infant's existence and with it are linked strong feelings of comfort, security, and protection. If for any reason this central act of sucking becomes unsatisfactory, the infant's feelings of security, comfort and protection are also upset. It can be observed how some childen 2 to 3 years of age, while sucking their thumbs, seem immune to events which under other circumstances promote feelings of fear and distress. The explanation is that they have retired into their world of fantasy and are no longer affected by the real events happening about them.

The first step in handling the problem of thumbsucking is to prevent its ever occurring and the responsibility for this hardly rests with the dentist. The pediatricians must instruct parents in a careful infant feeding technic. The appearance of thumbsucking in the infant should be recognized as a symptom of some imbalance in the sucking-feeding routine and steps taken at once to diagnose and correct it.

There is much lacking in many dental methods of treatment of thumbsucking habits. A tremendous responsibility rests upon all those who are charged with the care of young children, and many times, in their desire to help them in one direction, they cause irreparable harm in another.

Treatment should be considered at these levels: Preweaning period, immediate postweaning period, kindergarten period including 2, 3, and 4 year olds, and post-kindergarten period. Parent cooperation at all periods must be considered the most important factor.

J. C. Toothaker

SURGERY AND PROSTHESIS IN THE REHABILITATION OF CLEFT PALATE PATIENTS

Cloyd S. Harkins. Plast. & Reconst. Surg. 7:32, January, 1951.

Speech improvement in cleft palate cases is the goal of the surgeon, the prosthodontist, the speech therapist and the patient. The deficiencies which plague the cleft palate patient are clearly outlined as well as the corrections necessary to overcome them. The contribution that specialists can make when working together in full cooperation is delineated. "The modern humane and ethical surgeon must be cautious and careful in the selection of palate clefts for surgery. . . . Some postoperative failures are excusable and unfortunate, others are unnecessary and deplorable." The postoperative failures challenge the skill of the prosthodontist and there are conditions under which the surgeon may find it necessary to recreate the cleft to give the prosthodontist a better opportunity for success. "The selection of either surgery or prosthesis should be a unanimous decision after a joint examination and consultation by the surgeon, prosthodontist and speech clinician."

Charles W. Freeman

Deaths

Agate, Arthur R., Elyria, Ohio; School of Dentistry, Western Reserve University, 1914; died May 28; aged 61.

Anderson, Robert W., Portland, Ore.; School of Dentistry, North Pacific College of Oregon, 1902; died May 26; aged 75.

Baker, Frank W., Ogden, Utah; died June 5.

Beatty, Burrell B., Springfield, Ill.; Chicago College of Dental Surgery, Loyola, 1914; died May 9; aged 66.

Beck, Forrest S., Albion, Ind.; Indiana Dental College, 1919; died April 29; aged 55.

Best, Walter T., Freeport, Ill.; Dental School, Northwestern University, 1904; died April 13; aged 82.

Brassington, Orville E., Milwaukee; Dental School, Marquette University, 1914; died May 24; aged 63.

Brown, Edmund R., Malden, Mass.; Dental School, Tufts College, 1881; died May 8.

Brice, Harry D., Rumford, R. I.; Dental School, Harvard University, 1918; died May 19; aged 59.

Brumbaugh, Phillip G., Kansas City, Mo.; Kansas City Dental College, 1896; died May 24; aged 82.

Bryner, George L., Huntington, W. Va.; Baltimore College of Dental Surgery, University of Maryland, 1909; died March 15; aged 66.

Burdge, Fred B., Hopewell, N. J.; School of Dentistry, University of Pennsylvania, 1903; died April 5; aged 69.

Burner, Edwin L., Sabetha, Kan.; Kansas City Dental College, 1896; died March 5; aged 77.

Burrington, Therlo E., Rapid City, S. D.; College of Dentistry, University of Minnesota, 1916; died May 31; aged 57.

Caldwell, Warren C., Fort Clayton, C. Z.; Dental School, Tufts College, 1915; died May 2.

Campbell, Thomas W., Suffolk, Va.; School of Dentistry, Medical College of Virginia, 1924; died April 9; aged 50.

Carney, William G., East St. Louis, Ill.; Louisville College of Dentistry, 1899; died April 23.

Carruthers, James J., Galesburg, Ill.; Chicago College of Dental Surgery, Loyola, 1913; died March 15.

Carter, Moscow B., Franklin, Tenn.; School of Dentistry, Vanderbilt University, 1896; died March 18; aged 76.

Cartwright, Adam Y., York, S. C.; College of Dentistry, University of Tennessee, 1892; died January 30.

Case, Roy A., Davenport, Iowa; Dental School, Northwestern University, 1897; died April 28; aged 75.

Cash, William A., Helena, Mont.; died April 27; aged 69.

Channing, Gilbert C., California, Pa.; School of Dentistry, University of Pittsburgh, 1925; died April 6; aged 52.

Charters, William J., Ankeny, Iowa; Chicago College of Dental Surgery, Loyola, 1898; died March 12; aged 79.

Choate, William M., Marshalltown, Iowa; Dental School, Northwestern University, 1896; died April 17.

Costello, Hugh M., Biloxi, Miss.; Dental School, Marquette University, 1925; died April 26; aged 54.

Cromartie, Alva S., Fayetteville, N. C.; Atlanta Dental College, 1907; died May 9; aged 74.

Crumbaker, Harry E., Altoona, Pa.; School of Dentistry, Vanderbilt University; died April 26.

Davidson, Albert, Chicago; Chicago College of Dental Surgery, Loyola, 1940; died May 8; aged 48.

Davidson, David G., Wheeling, W. Va.; Cincinnati College of Dental Surgery, 1904; died May 18.

Delafield, William P., Dallas, Texas; School of Dentistry, Vanderbilt University, 1907; died May 16; aged 65.

Dennstedt, Frank A., Lakewood, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1911; died May 10; aged 63.

DeWitt, Harvey S., Middletown, N. Y., School of Dentistry, University of Pennsylvania, 1902; died May 20; aged 72.

Donovan, John, Belding, Mich.; Dental School, Northwestern University, 1939; died April 25; aged 55.

Dorsey, Walter T., Princeton, Ind.; Dental School, Northwestern University, 1898; died April 30; aged 77.

Downing, Ralph B., Altoona, Pa.; College of Dentistry, Howard University, 1916; died May 10; aged 57.

Ebner, Henry B., Tonica, Ill.; Chicago College of Dental Surgery, Loyola, 1901; died March 19.

Edwards, Jonathan P., Yarmouth, Mass.; Dental School, Tufts College, 1909; died May 8; aged 66.

Felzien, Joseph J., Corvallis, Ore.; College of Dentistry, Creighton University, 1916; died April 28; aged 65.

Fitch, Oscar P., Los Angeles; College of Dentistry, University of California, 1895; died May 10; aged 81.

Frankel, Ephraim E., Chelsea, Mass.; Dental School, Harvard University, 1925; died February 26; aged 51.

Franklin, Hamlet W., Pocahontas, Va.; School of Dentistry, Medical College of Virginia, 1931; died March 15; aged 42.

Frick, Charles H., New Orleans; School of Dentistry, Tulane University, 1910; died April 2; aged 75.

Friedland, Charles M., Pittsburgh; School of Dentistry, University of Pittsburgh, 1927; died May 23; aged 46.

Galbreath, Andrew J., Valley Center, Calif.; College of Dentistry, University of Tennessee, 1892; died March 13.

Gambill, John R., Harrisonburg, Va.; Baltimore College of Dental Surgery, University of Maryland, 1909; died March 16; aged 68.

George, Edward D., Geneva, Ill.; Chicago College of Dental Surgery, Loyola, 1898; died March 30; aged 77.

Gibbons, Paul M., Norwalk, Ohio; College of Dentistry, Ohio State University, died April 1; aged 47.

Gilday, Francis J., Everett, Mass.; Dental School, Tufts College, 1903; died March 13.

Glassgold, Bernard, San Francisco, died April 29.

Goodwin, Frank C., Fort Smith, Ark.; Dental Department, Meharry Medical College, 1904; died February 16; aged 69.

Grady, Wynan C., Blackshear, Ga.; Atlanta Dental College, 1911; died March 10.

Grapp, George L., Seattle; College of Dentistry, University of Minnesota, 1913; died May 3; aged 64.

Greenya, Eugene R., Milwaukee; Dental School, Marquette University, 1928; died March 11; aged 46.

Grotefend, George A., Redding, Calif.; School of Dentistry, University of Pennsylvania, 1889; died May 11; aged 82.

Grothaus, Walter W., New Bremen, Ohio; College of Dentistry, Ohio State University, 1927; died October 29; aged 60.

Gruenebaum, Morris, Cincinnati; Cincinnati College of Dental Surgery, 1906; died May 15; agd 65.

Hall, Alexander, Hornell, N. Y.; Ohio College of Dental Surgery, University of Cincinnati, 1892; died March 7; aged 89.

Hall, Alvin, Madison, W. Va.; Ohio College of Dental Surgery, University of Cincinnati, 1908; died May 8; aged 75.

Hall, James O., Waco, Texas; School of Dentistry, Vanderbilt University, 1901; died March 9; aged 76.

Hammen, William A., Huntington, W. Va.; Dental Department, University College of Medicine, Richmond, 1900; died May 14; aged 77.

Hammons, Robert W., Daytona Beach, Fla.; Western Dental College, Kansas City, 1898; died May 17; aged 73.

Hanley, James L., East Orange, N. J.; College of Dental and Oral Surgery, New York, 1921; died April 16; aged 55

Hanson, Lloyd W., St. James, Minn.; College of Dentistry, University of Minnesota, 1933; died May 3; aged 41.

Harrell, S. J., Minden, La.; died April 23.

Harris, Thomas H., Little Rock, Ark.; School of Dentistry, Vanderbilt University, 1918; died May 1; aged 57.

Hartshorn, J Walter, Toledo, Ohio; College of Dentistry, Ohio Medical University, 1900; died March 14.

Harvey, Guy B., Green Bay, Wis.; Chicago College of Dental Surgery, Loyola, 1897; died March 25; aged 81.

Harville, Ray J., Dumas, Texas; State Dental College, Dallas, 1916; died February 6.

Haynes, Frank P., Baltimore; Dental Department, Baltimore Medical College, 1901; died April 13; aged 73.

Hefele, Joseph H., Evansville, Ind.; School of Dentistry, Indiana University, 1905; died April 9.

Helfenbine, John A., Beaver Falls, Pa.; School of Dentistry, University of Pittsburgh, 1918; died April 26; aged 54.

Hendry, Charles W., Ludowici, Ga.; Southern Dental College, Atlanta, 1890; died February 3; aged 87.

Hermans, James, New York; School of Dentistry, University of Buffalo, 1901; died February 14.

Hess, Samuel S., Bloomsburg, Pa.; Philadelphia Dental College, 1899; died May 26; aged 77.

Hicks, W. R., Easley, S. C.; Atlanta Dental College, 1913; died April 4.

Hill, Earl J., Lakewood, Ohio; Cincinnati College of Dental Surgery, 1911; died December 30.

Hill, Finis L., Comanche, Texas; College of Dentistry, Baylor University, 1926; died May 7; aged 59.

Hindenach, Ralph B., Parsons, Kan.; School of Dentistry, St. Louis University, 1925; died January 13; aged 51.

Hirtz, Nathaniel F., Bell Gardens, Calif.; Dental Department, Milwaukee Medical College, 1897; died June 9; aged 76.

Hitchcock, Amos H., Elcho, Wis.; Dental School, Northwestern University, 1902; died March 7; aged 80.

Hoppe, Walter E., Portland, Ore.; College of Dentistry, University of Nebraska, 1928; died April 28; aged 48.

Horne, Woody L., Weldon, N. C.; College of Dentistry, Howard University 1917; died March 16; aged 58.

House, Ellis D., Kansas City, Mo.; Kansas City Dental College, 1902; died March 28.

Huff, Oliver W., San Ysidro, Calif.; College of Dental Surgery, University of Michigan, 1888; died February 18; aged 82.

Hull, James R., Chillicothe, Ohio; Cincinnati College of Dental Surgery, 1905; died May 27; aged 60.

Hyson, John M., Baltimore; Baltimore College of Dental Surgery, University of Maryland, 1927; died March 6; aged 47.

Ingman, Abner S., Baltimore; School of Dentistry, Vanderbilt University 1918; died April 2; aged 56.

Irwin, Edward B., Chicago; Chicago College of Dental Surgery, Loyola, 1917; died May 6.

Jackson, Colby C., Charleston, W. Va.; College of Dentistry, Ohio State University, 1935; died May 17; aged 39.

Jackson, James G., Norfolk, Va.; Baltimore College of Dental Surgery, University of Maryland, 1912; died April 14; aged 69.

Jackson, Lee A., Needham, Mass.; Kansas City Dental College, 1898; died March 5; aged 74.

Jensen, Norwood S., Milwaukee; Dental School, Marquette University, 1921; died April 17; aged 53.

Johnson, Henry W., Washington, D. C.; Dental Department, Columbia University, 1898; died March 13.

Johnson, Oscar, Statesboro, Ga.; Southern Dental College, Atlanta, 1914; died April 10; aged 65.

Jorgensen, James M., Ephraim, Utah; Dental School, Northwestern University, 1919; died March 13.

Joyce, Delmer R., Shelby, Mont.; Dental School, Northwestern University, 1917; died March 13; aged 56.

Kammerer, Wilfred W., Los Angeles; College of Dentistry, University of Southern California, 1926; died April 10; aged 55.

Kaufman, Emil H., San Francisco; College of Dentistry, University of California, 1905; died March 7.

Kelly, Edmund J., Culver City, Calif.; Chicago College of Dental Surgery, Loyola, 1904; died February 20.

Kent, Harry H., Ennis, Texas; State Dental College, Dallas, 1910; died March 6; aged 72.

Keuper, O. J., Marshall, Mo.; died February 25.

Keysor, Ephraim, Salt Lake City; New York College of Dentistry, 1881; died March 6.

Kimberlin, Frank K., Wanamaker, Ind.; School of Dentistry, Indiana University, 1905; died February 25.

King, Frank R., Wellfleet, Mass.; Dental School, Tufts College, 1919; died April 24; aged 53.

Kirk, Wilfred D., Kokomo, Ind.; College of Dental Surgery, University of Michigan, 1899; died April 2.

Kohler, Ernest A., Chicago; American College of Dental Surgery, Chicago 1891; died January 6.

Koss, Harry A., Indianapolis; School of Dentistry, Indiana University 1907; died May 26.

Kratochvil, Charles D., Omaha; College of Dentistry, Creighton University, 1918; died March 29; aged 57.

Kubo, August M., Hilo, T. H.; College of Dentistry, University of Iowa, 1927; died March 15; aged 51.

Lamb, Milton, New Castle, Ind.; School of Dentistry, Indiana University, 1887; died March 20; aged 90.

Lazenby, Glenn A., Statesville, N. C.; Southern Dental College, Atlanta, 1911; died May 1.

LeFevre, Harry W., Denver; School of Dentistry, University of Pennsylvania, 1888; died March 9.

Leigh, Charles L., Davenport, Iowa; College of Dentistry, University of Iowa, 1898; died April 14; aged 76.

Lentz, Frank C., Gary, Ind.; Chicago College of Dental Surgery, Loyola, 1916; died March 6; aged 59.

Lewis, Stephen J., Manassas, Va.; College of Dentistry, Howard University, 1909; died March 1; aged 69.

Lorber, Samuel Z., Chicago; Chicago College of Dental Surgery, Loyola, 1920; died March 6; aged 66.

Loveland, Clyde E., Wright City, Mo.; School of Dentistry, St. Louis University, 1918; died October 5.

Lynch, James W., Chicago; Chicago College of Dental Surgery, Loyola, 1920; died January 11; aged 67.

Mabis, William A., Amsterdam, N. Y.; Baltimore College of Dental Surgery, University of Maryland, 1903; died March 11; aged 71.

Marsden, Frank T., Washington, D. C.; School of Dentistry, Georgetown University, 1914; died April 28; aged 64.

Marshall, Clarence E., Livingston, Mont.; School of Dentistry, University of Louisville, 1916; died April 29.

Martin, Robert R., Charleston, W. Va.; School of Dentistry, Indiana University, 1934; died April 4; aged 43.

Mason, Ernest A., Omaha; Chicago College of Dental Surgery, Loyola, 1903; died in May; aged 80.

Matkin, Elmer H., Bonne Terre, Mo.; School of Dentistry, Washington University, 1900; died March 12; aged 76.

Matthews, Harry E., East Chicago, Ind.; Indiana Dental College, Indianapolis, 1924; died March 31; aged 51.

Mattis, Samuel I., Hollis, N. Y.; School of Dental and Oral Surgery, Columbia University, 1924; died February 21; aged 51.

Mayhew, William H., San Francisco; died May 29.

McConnell, Joseph W., Clairton, Pa.; Pittsburgh Dental College, Western University of Pennsylvania, 1901; died April 1; aged 80.

McCord, C. Stewart, Seattle; School of Dentistry, University of Pittsburgh, died March 2; aged 75.

McCracken, J. T., Durham, N. C.; Atlanta Dental College, 1897; died February 21; aged 83.

McElroy, John S., Topeka, Kan.; Kansas City Dental College, 1917; died March 26; aged 62.

McGrath, Ernest M., St. Louis; School of Dentistry, St. Louis University, 1915; died May 12; aged 63.

McHugh, William J., Freeland, Pa.; died March 22.

McKell, Lenard E., Provo, Utah; Chicago College of Dental Surgery, Loyola, 1925; died May 20; aged 54.

Mead, Harold L., Menominee, Mich.; College of Dental Surgery, University of Michigan, 1911; died March 13; aged 65.

Meagher, William G., Duncans Mills, Calif.; College of Physicians and Surgeons, 1917; died March 27; aged 67.

Meyer, Ernest E., Urbana, Ohio; Dental School, Northwestern University, 1917; died April 14, aged 64.

Mietus, Joseph, Wauwatosa, Wis.; Chicago College of Dental Surgery, Loyola, 1903; died April 22; aged 77.

Mills, Ray T., Grinnell, Iowa; College of Dentistry, University of Iowa, 1916; died May 6; aged 60.

Mithus, Edward J., Mount Horeb, Wis.; Chicago College of Dental Surgery, Loyola, 1908; died April 16; aged 69.

Moore, Edwin B., St. Louis; School of Dentistry, St. Louis University, 1915; died May 18; aged 59.

Moore, Horace D., Saugus, Mass.; died March 29.

Moran, Patrick H., Greenfield, Mass.; died May 24.

Morrell, Otto M., Erie, Pa.; Ohio College of Dental Surgery, University of Cincinnati, 1905; died April 24; aged 79.

Morton, John K., Milwaukee; died March 10; aged 88.

Mulder, Allen E., Clare, Mich.; College of Dental Surgery, University of Michigan, 1894; died March 17; aged 82.

Muspratt, Walter L., Philadelphia; Philadelphia Dental College, 1900; died April 18.

Neber, Lawrence W., Springfield, Ill.; College of Dentistry, University of Illinois, 1926; died March 28; aged 54.

Nelson, Duane L., Hollywood, Calif.; College of Dentistry, University of Southern California, 1936; died March 9; aged 39.

Nevers, Clarence A., Winthrop, Mass.; died April 15.

Nisbet, Taylor P., Waxhaw, N. C.; Baltimore College of Dental Surgery, University of Maryland, 1911; died April 10; aged 60.

Noble, Samuel C., Mineola, Texas; Chicago College of Dental Surgery, Loyola, 1901; died April 25; aged 75.

Nye, William E., Onawa, Iowa; College of Dentistry, University of Iowa, 1897; died March 11; aged 54.

O'Donnell, James R., Holyoke, Mass.; School of Dentistry, University of Pennsylvania, 1915; died April 22.

Oleski, Walter J., Bayonne, N. J.; Baltimore College of Dental Surgery, 1923; died May 23; aged 51.

Osson-Seffer, Ranier, Concord, Calif.; College of Physicians and Surgeons, 1919; died February 23; aged 60.

Osten, Ralph C. V., Herington, Kan.; College of Dentistry, Creighton University, 1909; died April 17; aged 65.

Overton, Mordecai H., Sayville, N. Y.; New York College of Dentistry, 1891; died March 25.

Ovitsky, Peter, Chicago; Chicago College of Dental Surgery, Loyola, 1919; died in March.

Oynes, Nels L., Chicago; Dental School, Northwestern University, 1919; died February 27; aged 63.

Packer, Samuel P., Preston, Idaho; Chicago College of Dental Surgery, Loyola, 1916; died April 13; aged 61.

Park, Watson A., St. Petersburg, Fla.; died March 16.

Parks, Robert S., Tiptonville, Tenn.; Dental School, Northwestern University, 1902; died in December; aged 74.

Payne, David B., Sherburne, N. Y.; died April 27.

Peak, Orin H., Redlands, Calif.; Western Dental College, Kansas City, 1897; died May 21; aged 79.

Pearce, Robert M., Orange, Calif.; Chicago College of Dental Surgery, Loyola, 1891; died April 12; aged 86.

Perkins, Ralph G., San Francisco; died April 18.

Peterson, Laurence M., Arlington, Neb.; College of Dentistry, University of Nebraska, 1917; died April 27; aged 57.

Prideaux, Oscar C., Elgin, Ill.; Dental School, Northwestern University, 1905; died May 29; aged 73.

Putnam, Charles W., Amesbury, Mass.; died May 1; aged 78.

Reinhardt, Adolph G., Pittsburgh; School of Dentistry, University of Pennsylvania, 1892; died April 25.

Reynolds, James D., Marietta, Ga.; Atlanta Dental College, 1899; died March 16; aged 72.

Rhea, Caleb O., Nashville, Tenn.; College of Dentistry, University of Tennessee, 1908; died May 28; aged 74.

Richards, Forrest C., Bridgewater, S. D.; Dental School, Northwestern University, 1915; died April 24; aged 57.

Robertson, George D., Grosse Pointe, Mich.; School of Dentistry, University of Detroit, 1937; died February 7; aged 39.

Robinson, Earl C., Carlton, Ore.; Chicago College of Dental Surgery, Loyola, 1904; died May 20; aged 73.

Robinson, Vincent M., St. Joseph, Mo.; Western Dental College, Tennessee, 1903; died March 8; aged 73.

Robinson, Walter H.; Rockville, Conn.; Philadelphia Dental College, 1900; died April 12; aged 75.

Rogers, Leo A., Boston; Dental School, Harvard University, 1902; died May 23; aged 72.

Rose, Archie J., Marlin, Texas; Ohio College of Dental Surgery, University of Cincinnati, 1903; died April 9.

Rowley, Homer S., Hoosick Falls, N. Y.; School of Dentistry, University of Pennsylvania, 1903; died May 10; aged 71.

Rounds, Frank W., Boston.; Louisville College of Dentistry of Centre College, 1910; died May 16; aged 69.

Runge, Carlisle, Seymour, Wis.; Dental School, Marquette University, 1914; died March 12; aged 67.

Runyan, Orville A., Omaha; College of Dentistry, Creighton University, 1914; died March 23; aged 61.

Sapienza, Benedict F., Birmingham, Ala.; School of Dentistry, University of Buffalo, 1920; died March 31; aged 53.

Sapranas, Stasys J., Waterbury, Conn.; Chicago College of Dental Surgery, Loyola, 1915; died May 22; aged 70.

Sawyer, Frederick O., Skowhegan, Me.; Philadelphia Dental College, 1884; died March 9; aged 88.

Sayers, Clayton A., Syracuse, N. Y.; School of Dentistry, University of Buffalo, 1904; died March 19.

Scherer, Walter H., Houston; Ohio College of Dental Surgery, University of Cincinnati, 1900; died May 12; aged 71.

Schultz, Louis, River Forest, Ill.; Chicago College of Dental Surgery, Loyola, 1901; died May 19; aged 84.

Secrist, Marion V., Alpena, Mich.; Dental School, Northwestern University, 1896; died March 3; aged 78.

Senesac, John B. H., New York; Chicago College of Dental Surgery, Loyola, 1904; died April 26; aged 77.

Seybold, Frank E., Ann Arbor, Mich.; School of Dentistry, University of Michigan, 1893; died April 29.

Shewey, Charles P., Canby, Ore.; Dental School, Northwestern University, 1900; died April 30; aged 74.

Shoemaker, Edwin, Philadelphia; School of Dentistry, University of Pennsylvania, 1912; died May 4; aged 63.

Silber, Samuel S., Newark, N. J.; Dental School, Tufts College, 1930; died May 9; aged 44.

Simonson, Alfred W., Minneapolis; College of Dentistry, University of Minnesota, 1912; died December 31; aged 63.

Simpson, Otis E., Mundelein, Ill.; Dental School, Northwestern University, 1896; died January 9; aged 83.

Slaff, Max, Passaic, N. J.; College of Dentistry, New York University, 1915; died May 19; aged 58.

Smith, Chester E., Philadelphia; School of Dentistry, University of Pennsylvania, 1911; died February 23.

Smith, Edward J. C., West Hampton Beach, N. Y.; School of Dentistry, University of Buffalo, 1914; died May 1; aged 58.

Smith, Robert E., Sacramento, Calif.; College of Dentistry, University of California, 1902; died April 10.

Smith, William H., Birmingham, Ala.; Birmingham Dental College, 1915; died March 30; aged 60.

Smith, William T., Wilmington, N. C.; Atlanta Dental College, 1899; died April 12; aged 78.

Spooner, Harold G., Providence; Dental School, Harvard University, 1918; died May 27.

Starksen, Arthur F., Brookings, S. D.; Dental School, Northwestern University, 1919; died May 25; aged 54.

Stevenson, Harold C., Colorado Springs, Colo.; Pittsburgh Dental College, Western University of Pennsylvania, 1906; died March 27; aged 65.

Strawn, Stephen H., Concord, N. C.; Atlanta-Southern Dental College, 1919; died December 13.

Stringfellow, Jack, Fort Worth, Texas; College of Dentistry, Baylor University, 1919; died May 26; aged 57.

Sugarman, Samuel, Brooklyn; New York College of Dentistry, 1916; died May 20; aged 64.

Sutherland, William H., Bloomfield, N. J.; College of Dentistry, Howard University, 1905; died May 19; aged 71.

Sutton, Germain P., Laredo, Texas; Dental School, Marquette University, 1928; died March 20.

Taggart, Robert W., Great Barrington, Mass.; Baltimore College of Dental Surgery, University of Maryland, 1898; died March 7; aged 76.

Tait, George B., Bossier City, La.; College of Dentistry, University of Tennessee, 1918; died March 4; aged 64.

Taylor, Robert L., San Anselmo, Calif.; College of Dentistry, University of California, 1893; died May 15; aged 82.

Taylor, William A., North Wilkesboro, N. C.; School of Dentistry, Vanderbilt University, 1896; died March 2; aged 79.

Thatcher, Charles A., Ashtabula, Ohio; died April 17; aged 87.

Thompson, Edgar W., Interlaken, N. Y.; School of Dentistry, Temple University, 1885; died March 28.

Thompson, John C., Chatham, Mass.; Dental School, Harvard University, 1907; died April 23; aged 71.

Thornley, Frederick S., Clarion, Iowa; College of Dental Surgery, Des Moines, 1901; died March 14; aged 74.

Tilly, Henry L., New Orleans; School of Dentistry, Loyola University, New Orleans, 1919; died February 28; aged 59.

Todd, Ezra W., New York; Pennsylvania College of Dental Surgery, Philadelphia, 1888; died April 28.

Tormey, Richmond J., San Francisco; College of Physicians and Surgeons, 1919; died March 18.

Townsend, James A., Alva, Okla.; Chicago College of Dental Surgery, Loyola, 1902; died March 1; aged 76.

Trotter, Herbert M., Cape Charles, Va.; School of Dentistry, Medical College of Virginia, 1932; died May 19; aged 45.

Turken, Jacob, West New York, N. J.; School of Dentistry, University of Pennsylvania, 1922; died May 8; aged 51.

Valaske, Arnold J., Kenosha, Wis.; Dental School, Marquette University, 1926; died March 26; aged 59.

Van Kirk, Charles H., Ellenville, N. Y.; School of Dentistry, Temple University, 1898; died May 27.

Walker, Ernest S., Tamaqua, Pa.; Ohio College of Dental Surgery, University of Cincinnati, 1904; died April 6; aged 77.

Wall, Edward B., Springfield, Ill.; Dental Department, National University, Washington, 1897; died May 18.

Wall, William H., Chicago; Chicago College of Dental Surgery, Loyola, 1910; died March 28; aged 65.

Ward, C. Clayton, Hartford, Conn.; School of Dentistry, Temple University, 1904; died October 13.

Warner, Frank W., Angelica, N. Y.; Philadelphia Dental College, 1891; died April 2; aged 85.

Watts, William H., Chicago; Dental School, Northwestern University, 1908; died May 18; aged 66.

Weaver, Joseph H., Cincinnati; Cincinnati College of Dental Surgery, 1904; died April 10; aged 74.

Webster, Marion F., Dallas, Texas; College of Dentistry, Baylor University, 1924; died May 20; aged 55.

Weiss, Adolph, Chicago; Chicago College of Dental Surgery, Loyola, 1915; died January 14; aged 56.

Weitzel, Henry M., Shippensburg, Pa.; Baltimore College of Dental Surgery, University of Maryland, 1932; died April 25; aged 43.

Wells, Irwin J., El Cajon, Calif.; College of Dentistry, University of Southern California, 1916; died May 14; aged 58.

Wells, W. D., Wadley, Ga.; died April 7.

Wells, Woodley R., Philadelphia; School of Dentistry, University of Pennsylvania, 1925; died May 6; aged 54.

West, Bertrum R., Philadelphia; Philadelphia Dental College, 1903; died May 16; aged 76.

Westman, Conrad A., Cadillac, Mich.; College of Dental Surgery, University of Michigan, 1924; died March 19; aged 50.

White, John R., Warsaw, Ind.; Indiana Dental College, 1898; died March 10; aged 80.

White, Walter H., Boston; died May 10.

Wilcox, George W., Benton Harbor, Mich.; Chicago College of Dental Surgery, Loyola, 1903; died May 5.

Wilcox, Theodore R., Seal Beach, Calif.; College of Dentistry, University of Southern California, 1927; died May 15; aged 51.

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Operative Dentistry: Rex Ingraham, 122 E. Sixteenth St., Los Angeles
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Roentgenology: L. R. Main, 3556 Caroline St., St. Louis
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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Second Annual Session	Oct. 15-18, 1951	Washington, D. C.
Ninety-Third Annual Session	Sept. 8-11, 1952	St. Louis
Ninety-Fourth Annual Session	Sept. 28-Oct. 1, 1953	Cleveland

MEETINGS OF STATE SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 14, 15, 1952	Birmingham	G. W. Matthews	1922 Tenth Ave., S., Birmingham 5
Alaska	Aug. 14-16	Juneau	J. Geyer	Box 915, Juneau
Arizona		Phoenix	E. M. Scott	1017 Professional Bldg., Phoenix
Arkansas		Little Rock	D. M. Hamm	White Bldg., Clarksville
California	Apr. 21-23, 1952	San Francisco	L. R. Ludwigsen	450 Sutter St., San Francisco
S. California			C. A. Moss	1401 S. Hope St., Los Angeles
Colorado	Sept. 30-Oct. 3	Colorado Springs	R. A. Downs	724 Republic Bldg., Denver 2
Connecticut	May, 1952	Bridgeport	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware	Jan. 1952		S. J. Krygier	309 S. State St., Dover
District of Columbia	Mar. 9-12, 1952	Washington	K. H. Wood	202-1835 Eye St., N. W., Washington
Florida	Apr. 20-23, 1952	Jacksonville	T. A. Price	808 Congress Bldg., Miami
Georgia	Sept. 23-26	Atlanta	J. M. Heard, Jr.	Persons Bldg., Macon
Hawaii	Sept. 27-29	Hilo	J. H. Dawe	810 N. Vineyard St., Honolulu 17
Idaho	Sept. 27-29	Lewiston	H. M. Klaaren	Breier Bldg., Lewiston
Illinois	May 19-22, 1952	Springfield	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana	May 12-14, 1952	Indianapolis	E. E. Ewbank	Kingman
Iowa	May 5-7, 1952	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 4-7, 1952	Topeka	F. A. Richmond	Brotherhood Bldg., Kansas City
Kentucky	Mar. 31-Apr. 2, 1952	Louisville	A. B. Coxwell	1976 Douglas Blvd., Louisville
Louisiana	Apr. 17-19, 1952	Shreveport	J. S. Bernhard	407 Medical Art Bldg., Shreveport
Maine	June, 1952	Rockland	S. Gower	Skowhegan
Maryland	May 4-7, 1952	Baltimore	E. L. Pessagno, Jr.	415 Medical Arts Bldg., Baltimore 1
Massachusetts	May 4-7, 1952	Boston	H. E. Tingley	12 Bay State Road, Boston
Michigan	Apr. 21-23, 1952	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Feb. 18-20, 1952	St. Paul	C. V. E. Cassel	242 Lowry Medical Arts Bldg., St. Paul
Mississippi			H. M. Campbell	428 Gloster St., Tupelo
Missouri	Sept. 12, 1952	St. Louis	R. R. Rhoades	201 Merchants Bank Bldg. Jefferson City
Montana	May 1-3, 1952	Butte	C. S. Renouard	304 Phoenix Bldg., Butte
Nebraska	May 12-14, 1952	Omaha	F. A. Pierson	1112 Federal Securities Bldg., Lincoln
Nevada	June, 1952	Reno	R. La Fond	Medical Dental Bldg., Reno
New Hampshire	June 29-July 1, 1952	Bretton Woods	F. E. Williams	814 Elm St., Manchester
New Jersey	Apr. 23-25, 1952	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico			J. S. Eilar	Suite 7, Medical Arts Square, Albuquerque
New York	May 12-15, 1952	Syracuse	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 11-14, 1952	Pinehurst	B. N. Walker	Liberty Life Bldg., Charlotte
North Dakota		Minot	J. H. Lunday	302 Black Bldg., Fargo
Ohio	Nov. 25-28	Cleveland	E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 20-23, 1952	Oklahoma City	R. C. Calkin	Calkin Bldg., Guthrie
Oregon	Mar. 3-5, 1952	Portland	H. C. Fixott, Jr.	308 Selling Bldg., Portland
Panama Canal Zone	Dec.	Balboa	O. Slavin	Box 415, Balboa
Pennsylvania	Sept. 11-14	Pittsburgh	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	Jan. 1952	San Juan	R. Carrasquillo	Box 214, Rio Piedras
Rhode Island	Jan. 1952	Providence	M. L. Biderman	144 Westminster St., Providence
South Carolina		Greenville	J. R. Owings	7 Medical Court, Greenville
South Dakota	May 18-20, 1952	Mitchell	E. W. Elmen	Sioux Falls
Tennessee	May 5-7, 1952	Memphis	W. L. McCulley	Brown Bldg., Cleveland

State	Date	Place	Secretary	Address
Texas	Apr. 28-May 1, 1952	Fort Worth	W. Ogle	3607 Gaston Ave., Dallas
Utah			E. O. Thompson	915 Medical Arts Bldg., Salt Lake City
Vermont	May, 1952	Woodstock	W. J. Reardon	Rutland
Virginia	Apr. 28-30, 1952	Virginia Beach	J. E. John	804 Medical Arts Bldg., Roanoke
Washington	May 15-17, 1952	Seattle	C. R. Flood	230 Cobb Bldg., Seattle
West Virginia			A. B. Drake	508 West Virginia Bldg., Huntington 1
Wisconsin	Apr. 14-17, 1952	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee
Wyoming			T. I. Drew	State Capitol Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

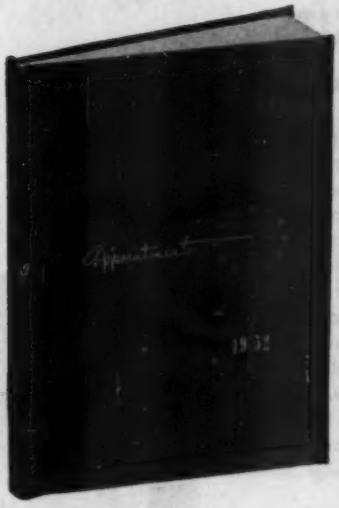
State	Date	Place	Secretary	Address
Alabama			M. D. Edwards	120 Adams, Montgomery
Alaska	Aug. 6-11	Ketchikan	J. H. Geyer	P. O. Box 915, Juneau
Arizona	Aug. 15-18	Florence	R. K. Trueblood	25 N. Second Av., Glendale
Arkansas			H. O. Weatherly	205 Halter Bldg., Conway
California			K. I. Nesbitt	507 Polk St., San Francisco 2
Colorado			W. D. McCarthy	724 Republic Bldg., Denver 2
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. M. Falls	1801 Eye St., N. W., Washington 6
Florida			A. W. Keilner	P. O. Box 155, Hollywood
Georgia			S. H. Yarbrough	Medical Arts Bldg., Columbus
Hawaii	Aug.	Honolulu	H. L. Houvener	427 Dillingham Bldg., Honolulu
Idaho	Aug. 7	Boise	W. K. Adams	718 Arthur St., Caldwell
Illinois	Nov. 6-9*	Chicago	W. A. McKee	503 Wood Bldg., Benton
Indiana			C. A. Frech	504 Broadway, Gary
Iowa			H. M. Willits	719Roshek Bldg., Dubuque
Kansas			G. L. Teall	Box 71, Hiawatha
Kentucky			R. I. Todd	Western Union Bldg., Richmond
Louisiana			A. R. deNux	Marksville
Maine			R. A. Derbyshire	Box 387, Skowhegan
Maryland	Nov. 5-7	Baltimore	H. Levin	3429 Park Heights Ave., Baltimore 15
Massachusetts			J. C. Wilson	State House, Boston 33
Michigan			J. L. Champagne	3714 W. McNichols Road, Detroit 21
Minnesota			F. A. Larson	1632 Washington St., N.E., Minneapolis
Mississippi	Jan. 7, 1952	Jackson	J. C. Boswell	508 Lamar Life Bldg., Jackson
Missouri			R. R. Rhoades	Central Trust Bldg., Jefferson City
Montana			P. M. Feda	Box 865, Helena
Nebraska			C. A. Bumstead	924 Stuart Bldg., Lincoln
Nevada			G. C. Steinmiller	Masonic Temple, Reno
New Hampshire			J. B. Brown	5 N. State St., Concord
New Jersey			W. A. Wilson	150 E. State St., Trenton 8
New Mexico			J. J. Clarke, Sr.	Artesia
New York			D. W. Beier	23 S. Pearl St., Albany 7
North Carolina			F. O. Alford	1109 Liberty Life Bldg., Charlotte 2
North Dakota			A. B. Crabtree	Ellendale
Ohio	Oct. 22-27	Columbus	H. B. Smith	322 E. State St., Columbus
Oklahoma			J. B. Cole, Jr.	706 Asp, Norman
Oregon	Dec. 3-6*	Portland	A. F. Davis	306 Public Service Bldg., Portland
Pennsylvania			R. E. V. Miller	Northampton National Bank Bldg., Easton
Puerto Rico		Santurce	L. C. Coll	Box 3717, Santurce
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina			E. G. Bumgardner	1517 Hampton St., Columbia
South Dakota			K. A. Stormo	Lead
Tennessee			F. S. Maxey	804 Bennie Dillon Bldg., Nashville 3
Texas	Sept. 23-29†	Dallas	R. T. Weber	312 Capital National Bank Bldg., Austin
	Sept. 26-28‡	Dallas		
Utah			J. J. Dalpiaz	Helper
Vermont			F. A. Reid	Windsor
Virginia			J. M. Hughes	715 Medical Arts Bldg., Richmond 19

State	Date	Place	Secretary	Address
Washington			J. B. Kiefer, Jr.	510 Cobb Bldg., Seattle
West Virginia	June 23-25, 1952	West Liberty	C. A. Laughlin	613 Prunty Bldg., Clarksburg
Wisconsin			S. F. Donovan	Tomah
Wyoming			W. J. Ryan	208 Boyd Bldg., Cheyenne

*Dentistry and dental hygiene.
†Dental examinations.
‡Dental hygiene examinations.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
American Academy of Dental Medicine	Dec. 2	New York	W. M. Greenhut Secy.	124 E. 84th St., New York 28
American Academy of Periodontology	Oct. 11-13	Washington, D. C.	C. E. Chamberlain Secy.	115 North St., Peoria, Ill.
American Association of Dental Examiners	Oct. 12, 13	Washington, D. C.	C. A. Bumstead Secy.	924 Stuart Bldg., Lincoln, Neb.
American Dental Assistants Association	Oct. 15-18	Washington, D. C.	M. L. Martin Exec. Secy.	410 First National Bank Bldg., LaPorte, Ind.
American Dental Society of Europe	Aug. 1-4	Lausanne, Switzerland	F. D. Derrick Secy.	140 Park Lane, London, W.1., England
American Denture Society	Oct. 13, 14	Washington, D. C.	A. L. Roberts Secy.	Aurora National Bank Bldg., Aurora, Ill.
American Public Health Association	Oct. 29-Nov. 2	San Francisco	R. M. Atwater Exec. Secy.	1790 Broadway, New York 19
American Society for the Advancement of General Anesthesia in Dentistry	Oct. 22	New York	M. H. Feldman Exec. Secy.	730 Fifth Ave., New York
American Society of Dentistry for Children	Oct. 12-14	Washington, D. C.	M. Keiner Program Chm.	1930 Chestnut St., Philadelphia 3
Asociacion Odontologica Argentina	Sept. 24-26	Buenos Aires, Argentina	A. C. Guevara Secy.	959 Junin, Buenos Aires, Argentina
Canadian Dental Association	Sept. 23-26	Ottawa, Ontario	D. W. Gullett Secy.	234 St. George St., Toronto 5, Ontario, Canada
Chicago Dental Society	Feb. 4-7, 1952	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Great Lakes Society of Orthodontists	Nov. 5-7	Cleveland	C. R. Anderson Secy.	402 Loraine Bldg., Grand Rapids, Mich.
Greater New York Dental Meeting	Dec. 3-7	New York	S. G. Standard Gen. Chm.	Room 106A, Statler Hotel, New York 1
Journees Dentaires de Paris, International Congress	Nov. 21-25	Paris, France	R. Rolland Secy. Gen.	15, Boulevard Malesherbes, Paris VIII, France
Midcontinent Dental Congress	Nov. 25-28	St. Louis	J. E. Brophy Exec. Secy.	927 Syndicate Trust Bldg., St. Louis 1
National Dental Association	Aug. 13-17	Memphis, Tenn.	J. A. Jackson Secy.	P. O. Box 197, Charlottesville, Va.
New England Dental Society	Sept. 26, 27	Boston	A. R. Wilson Secy.	43 Farmington Ave., Hartford 5, Conn.
New Orleans Dental Conference	Nov. 11-14	New Orleans	M. R. Matta Secy.	629 Maison Blanche Bldg., New Orleans
Southern Society of Orthodontists	July 31-Aug. 2	White Sulphur Springs, W. Va.	F. P. Bowyer Secy.	608 Medical Arts Bldg., Knoxville, Tenn.
Twelfth Congress of French Stomatology	Oct.	Paris, France	P. Fries Secy.	42 Rue Notre-Dame-des-Champs, Paris VI, France



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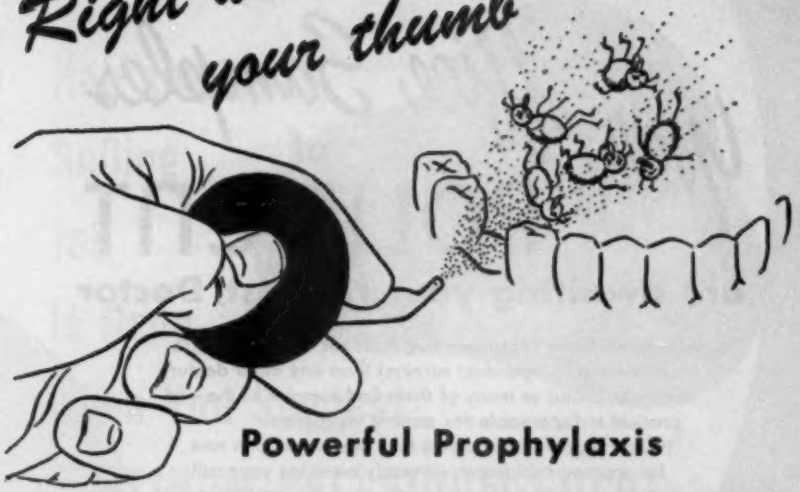

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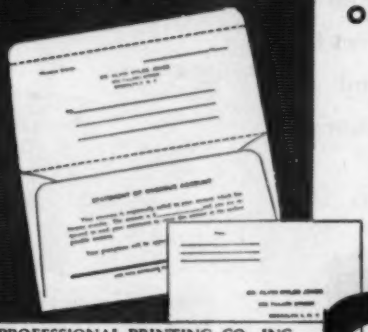

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(c) Public health dentist; administrative appointment; Pacific Coast.

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(d) Pedodontist to become associated with pedodontist, Michigan.

•

(e) Full time institutional position; Pacific Northwest.

•

(f) Orthodontist; association, busy practice; Midwest.

•

(g) Pedodontist or general practitioner; association with general practitioner; college town, Massachusetts.

•

(h) Dentist to locate in county seat town, Idaho; no dentist within fifty miles.

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(i) Dentists prepared for teaching for following: (1) Pedodontists, full or part-time; Midwest. (2) Denture prosthesis, crown and bridge prosthesis, operative dentistry; South. (3) Pedodontics, Bacteriology, Clinical Pathology, Pharmacology, Prosthetics, Operative Dentistry; South. (4) Pedodontics and other departments in clinical medicine, Midwest. (5) Oral histology, pathology; East. (6) Prosthodontics, Restorative Dentistry; Midwest.

(j) Oral surgeon qualified to head department and, also, assistant or associate professor, oral surgery; university school of dentistry.

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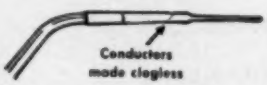

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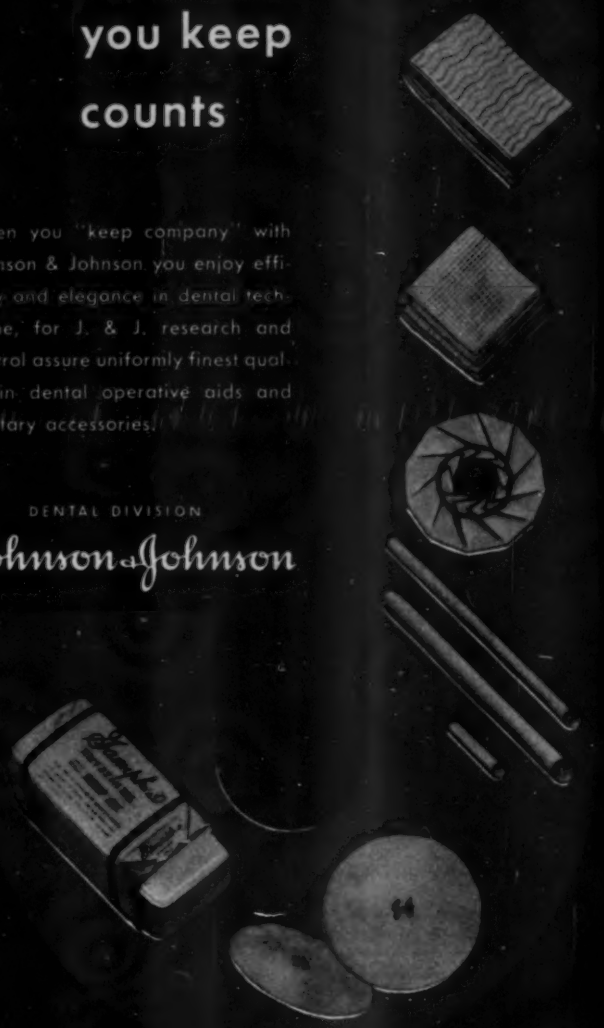

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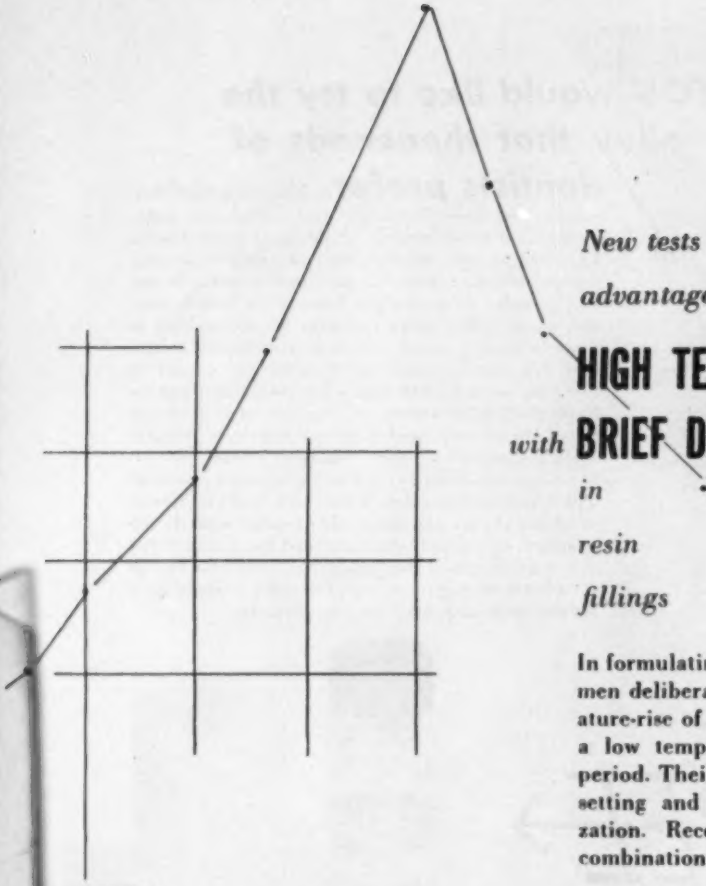
☐ Charge thru dealer.
☐ Enclosed find check or money order for $11.50.
☐ Send C.O.D. for $11.50.
In any case, please be sure to give dealer's name.

Doctor _____

Address _____

My dealer is _____



New tests confirm

advantages of

HIGH TEMPERATURE-RISE *with* BRIEF DURATION

in

resin

fillings

In formulating KADON, Caulk research men deliberately sought a high temperature-rise of brief duration, rather than a low temperature-rise over a longer period. Their aim, obviously, was faster setting and more complete polymerization. Recent tests prove that this combination also leads to

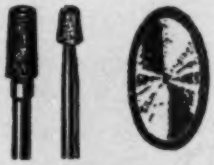
- ***highest strength***
- ***lowest flow***
- ***less residual monomer***

In addition, a recent series of histological studies indicates that pulp recovers without incident even when dentin is exposed to temperatures as high as 300°F. — far above the highest temperature ever recorded in a KADON filling. You can be certain, therefore, that the curing temperature of KADON is both *safe* for the tooth and *favorable* for successful restorations.

Caulk

KADON®

RESIN FOR RESTORATIVE DENTISTRY



More and More Dentists Ask for

INDIAN HEAD NON-CLOGGING DIAMOND POINTS or WHEELS

5 for $10.00

- Finest quality; long wearing
- Fast, smooth, even cutting
- May be used on any hard amalgam found in natural teeth
- This offer subject to immediate withdrawal without notice.

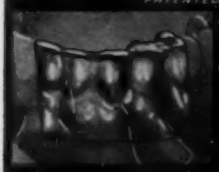
INDIAN HEAD DIAMOND STRIPS—for use with Acrylics, narrow and wide, $5.00 per set of 2.

Write for Literature

UNION BROACH CO., INC.
37 W. 20th St. New York 11, N. Y.

Burlew Dryfoil

PATENTED



Use It to Line Compression Matrix for PLASTIC FILLINGS

Also to Seal and Protect Against Saliva

Use it over synthetic fillings, cemented crowns, etc., while setting; to isolate medicated areas, packed sockets. $1.25 a box.

Ortho Dryfoil

A tougher form of Dryfoil for orthodontists; seals bands while cement sets.

$1.25 a box.

From Your Dealer — Send for Sample

J. F. JELENKO & CO., INC.
136 WEST 52nd ST. — NEW YORK 19

SAFE EFFECTIVE

GERMICIDAL SOLUTION

ONLY 16¼¢ PINT

Accepted

COUNCIL ON DENTAL THERAPEUTICS
AMERICAN DENTAL ASSOCIATION

Parker's

GERMICIDAL TABLETS

Just two Parker's Germicidal tablets dropped in a pint of water and stirred, quickly disintegrate to produce a 1:1000 solution of stable, active germicidal solution—A.D.A. accepted. Then, instruments need only to be washed free of pus, blood, protein material or soap and immersed for 15 minutes in the germicidal solution for safe chemical disinfection.

Heat sterilization—not chemical disinfection—is indicated on all hypodermic needles and instruments that are hinged, have deep narrow crevices, or surfaces with difficult access, or are suspected of having been contaminated with spores or Mycobacterium tuberculosis.

- **ECONOMICAL**—Two tablets make one pint of germicidal solution costing 16¼c.
- **TIME SAVER**—No bulky bottles of liquid to store—or to pour.
- **NON-CORROSIVE**—No anti-rust tablets necessary.
- **NON-TOXIC, NON-IRRITATING**—Makes an excellent hand sanitizing rinse for use between patients, or for the cleaning and disinfection of head rests, arm rests, bowls, cabinet drawers, etc.

Bottles of 80 Tablets (Equivalent to 5 gallons of solution) **$6.50**

Mfd. by A. A. PARKER CO., Phila., Pa.
Distributed by
B. G. HATCH CO. [illegible] N. Y.

TABLETS
BUFFERED
Crystalline
Penicillin G
Potassium

CSC

250,000 UNITS

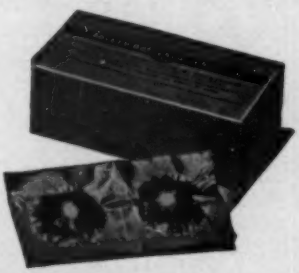
Prophylactically Following Exodontia

In exodontia, the value of prophylactic penicillin administration to patients with rheumatic heart disease or severe infection is well established. Given before and following extraction, penicillin greatly reduces the incidence of blood-borne infection and minimizes the chances for secondary complications both *in situ* and in distant structures.

Tablets Buffered Penicillin-C.S.C., providing 250,000 units of potassium penicillin G per tablet, are an excellent means of instituting prophylactic therapy. A single tablet 4 to 6 times daily is usually adequate.

The oral administration of penicillin has also been recommended pre- and postoperatively when there is danger of systemic infection following surgery, especially in the case of infected tonsils, periapical abscesses, etc. For this purpose a minimum of 750,000 units should be given during the 24 hours before operation and 500,000 to 1,000,000 units daily in divided doses every 4 hours after operation for 3 or 4 days.

At your prescription pharmacy in boxes of 10 tablets, each tablet individually sealed in foil.



CSC Pharmaceuticals

A DIVISION OF COMMERCIAL SOLVENTS CORPORATION, 17 EAST 42ND STREET, NEW YORK 17, NEW YORK

REST WHILE YOU WORK TO HAVE FUN WHILE YOU PLAY —WITH ROTA-SEAT

Rota-Seat gives you complete operating freedom —SITTING DOWN. It will add years, profitable years, to your professional career, because when you work sitting down you banish exhaustion, backache, bending and twisting stresses that can build up to serious organic disorders. You can take care of more patients, too, for you will need fewer rest periods.

Rota-Seat is the ORIGINAL operating seat for dentists (not merely a rest stool), you sit on deep, foam rubber, and roll easily to any operating position. More and more dental colleges are endorsing Rota-Seat's "sit-down" technique every day—send for fully illustrated booklet showing how to combat fatigue and live longer—the energy-saving, Rota-Seat way.

Ask your dental supply dealer to show you how easy it is to operate from a Rota-Seat in *your own* office. Thousands of satisfied users.

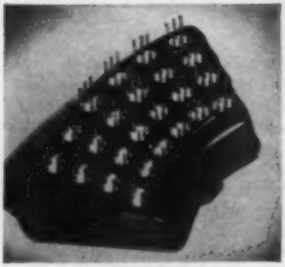
EXTRA COMFORT FOR YOUR PATIENTS, TOO . . . .

Instead of the patient holding his head in one position, forcing you to operate from many different, uncomfortable angles, the new Rota-Seat Head Rest permits turning the patient's head to offer easier access for the dentist, thus proving more comfortable for patient and dentist alike. The Rota-Seat Head Rest is adjustable to fit *any* type or make of chair. Made in one piece, large enough to accommodate any size head, of 1¼ in. thick foam rubber, covered with black vinylite to resist acids, water, oil, and all solvents, it can easily be kept clean by ordinary washing. Ask your dental supply dealer for details, or write us direct, giving your dealer's name.

rota-seat INC.

DENTAL EQUIPMENT SPECIALISTS

4606 W. 21st St. Cicero 50, Ill.



Ash
"BT" BUR ASSORTMENT

ASH BURS, made in England to British craft standards, have the *extra* quality which distinguishes all high-grade British products. Turned by skilled craftsmen from specially selected tungsten steel, Ash Burs are sharp for easier, faster cutting, and extra true for steadier, smoother running. Regular, Miniature and Taper Shank types are available in all usual shapes and sizes.

Place an order for fine Ash Burs with your local dealer today.

Claudius Ash, Sons & Co. U.S.A. Inc.
127-131 Coit Street **Irvington 11, New Jersey**
Trade Distribution Agents in U.S.A. for
AMALGAMATED DENTAL ENGINEERING INDUSTRIES LTD., Walton-on-Thames, England

THE NAME "ASH" HAS IDENTIFIED FINE DENTAL INSTRUMENTS FOR OVER 130 YEARS.

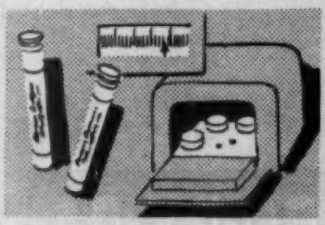
Two important pellets add to patient satisfaction

Unquestionably, the fit of a cast restoration must be perfect in order to attain complete patient comfort and satisfaction. To achieve this end, Durallium researchers first developed extremely sensitive and accurate materials for duplicating and investing. But to stop there would have been folly, for certainly, *the conditions under which materials are used are fully as important as the materials themselves.*

For example, assume that an investment is developed that will give perfect results if heated to X temperature in the furnace. A significant variation from X temperature will cause a variation of expansion in the investment. Result: poor adaptation. Of course, the problem lies not in the investment, but in controlling the furnace heat.

Many fine electronic furnace temperature controls are available, and Durallium laboratories have long used such devices to advantage. However, it has been found that after continued use these heat-controllers often give untrue readings. So, in order to insure consistently accurate fits for Durallium castings, our chemists searched for, and found, an absolutely dependable means of checking furnace temperatures and temperature recording instruments.

Durallium laboratories now check their furnace heats with two small pellets, called Tempils. They put the two



pellets in their furnace—one that melts just below the right temperature, and one that has a slightly higher melting point. If neither pellet melts, the furnace is not hot enough. If both pellets melt, the furnace is too hot. If only the pellet with the lower melting point dissolves, the furnace is at the correct temperature. By checking their furnaces regularly in this manner, Durallium laboratories give you one more assurance of perfect adaptation and complete patient satisfaction.

Tempils illustrate how, with the unique Durametric Technique, Durallium laboratories are equipped to give you Durallium castings that are unparalleled for accuracy, unequalled for patient comfort and satisfaction.

Watch for the unique Centrimetric System of Denture Construction...available soon through your Durallium laboratory

Durallium
PRODUCTS CORP.
809 W. Washington Blvd., Chicago 7, Ill.

Our hands uphold the highest standards of quality in a denture adhesive; and our hearts the highest ideals of faithful service to the dental profession.

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Mail this coupon for your supply of professional samples

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21-H

CO-RE-GA CHEMICAL CO. • 76 Mill Road, Jersey City 6, N. J.

How chrome alloys differ... **#4** in a series

"go with the grain, doctor!"

You know — "The finer the grain, the stronger the metal." Only TICONIUM of the chrome alloys has fine grain structure! That gives you stronger cases, resilient clasps — and TICONIUM is famous for accuracy. Different? Of course! Hydrocolloid duplicating material; controlled plaster-bound investment; exclusive electric melting technique; assure fine grain structure — exclusive with your TICONIUM laboratories.

Ticonium *is different . . . better . . .* **SURE**

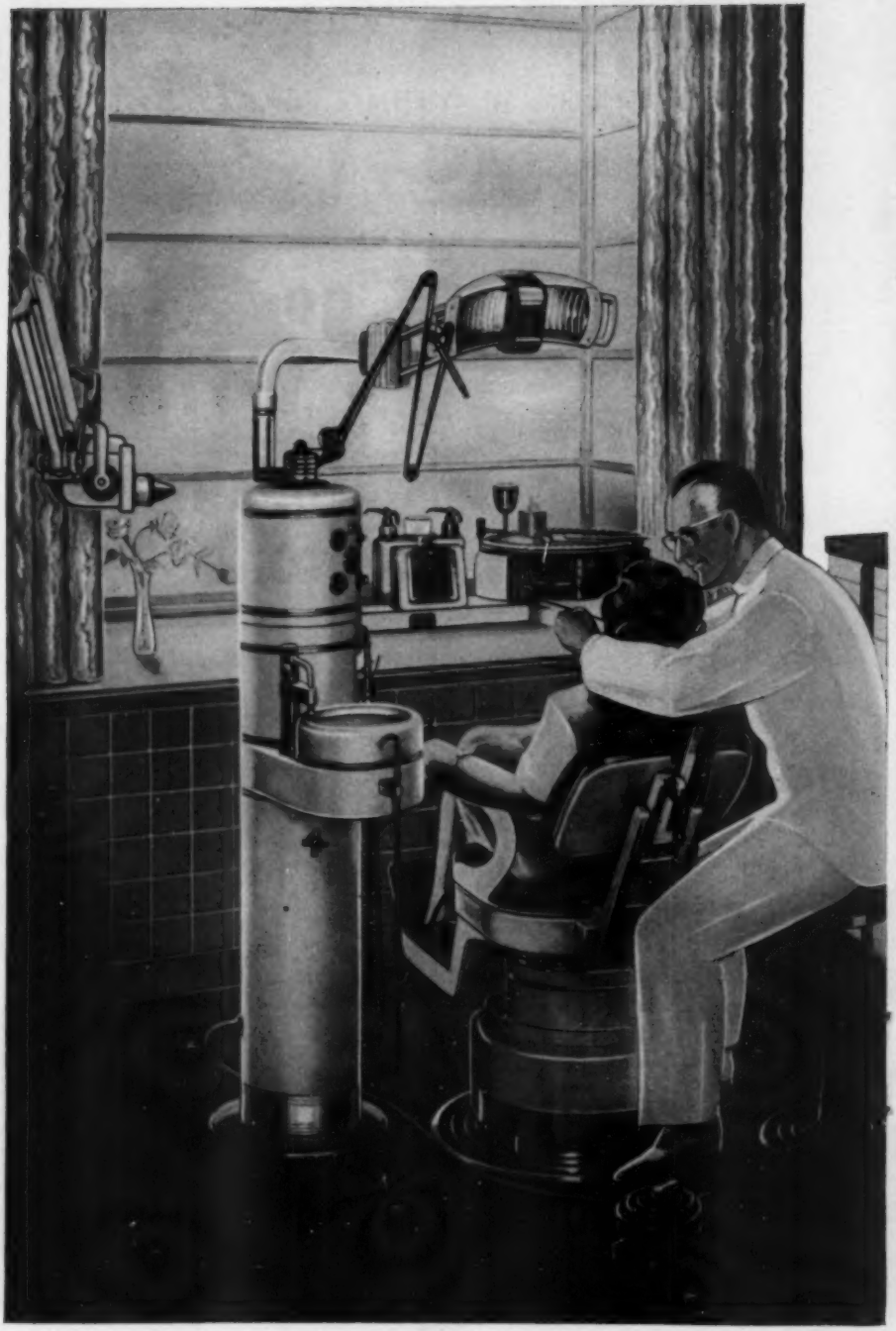
TICONIUM — 413 N. PEARL ST., ALBANY 1, N. Y.

PLEASE MAIL BROADSIDE, "THE DIFFERENCE BETWEEN CHROME ALLOYS."

DR.....

STREET.....

CITY.....ZONE.....STATE.....



S.S.WHITE MASTER UNIT A and MOTOR CHAIR

No other unit brings so many of the essential accessories to such finger-tip closeness as the Master Unit A. The table and all its accessories come to your operating position. There, ready for instant use are the following: air cut-off, mouth and antrum lamps, mirror, warm air syringes, sprays, cauteries and X-ray illuminator. Yes, the Master Unit A eliminates, wherever possible, unnecessary reaching and stretching; a built-in feature to help banish afternoon fatigue. See a convincing demonstration today and assure yourself of a sound investment in the most modern unit obtainable.

Easiest Chair to Work Around!

The S. S. White Motor Chair offers the lowest operating position of motor chairs. It is neat, compact; smooth and quiet in operation. All controls are convenient, simple, positive. Seat and self-adjusting backrest are form-fitting; the patient is comfortable and remains so in good operating position; does not slip foreward.

Free Office Planning Department and Easy Payment Terms

THE S. S. WHITE DENTAL MFG. CO.
Philadelphia 5, Pa.
"Over a Century of Service to Dentistry"

versatile Indicator Gel

Eliminates 95% of denture makeovers

FOR CORRECTING pressure areas on new or old dentures.

FOR REBASE impressions in the denture itself.

FOR CORRECTING impressions.

FOR LOCATING points of clasp pressure.

FOR CORRECTING occlusion.

FOR DETERMINING where and how to trim a denture to increase suction and eliminate sore spots.

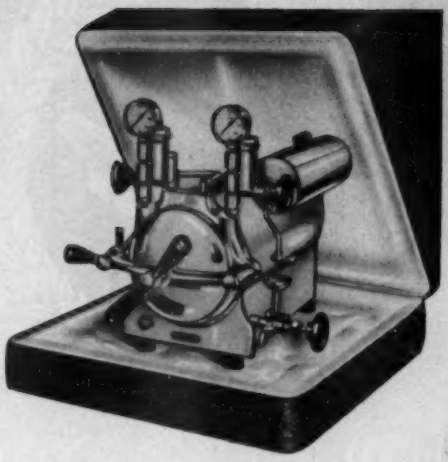
D-P Indicator Gel, correctly used, eliminates 95% of denture makeovers—as has been proved by the practical experience of innumerable dentists!

Order from your Dental Dealer NOW

dental perfection co.

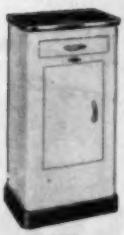
543 W. Arden Ave., Glendale 3, Calif.

The Office Jewel You'll be Proud to Own... with the **SPEED** *and* **SAFETY** *You'll Prize*



NEW PELTON FL-2 AUTOCLAVE

Here is equipment that not only dignifies and decorates the professional office, but, at the same time, dispels fear of post-operative infection. Its 6 by 12-inch pressure chamber offers the ultimate in positive destruction of spore-bearing bacteria. And the FL-2 is as *fast* as it is *safe*. It reduces the time between consecutive sterilizing periods from many minutes to seconds.



MODEL 70

SPECIAL PELTON CABINETS for FL-2 AUTOCLAVE

These two new Pelton cabinets have been specially designed to accommodate the FL-2. Graceful lines and quality construction are in keeping with the Autoclave's beauty and efficiency.

The FL-2 is a long-time investment. You will not regret waiting for delivery.

MODEL 40

PELTON

THE PELTON & CRANE CO., DETROIT 2, MICHIGAN

Marvel

OF PROFESSIONAL SKILL

but..

its merits are lost if it's left in the bureau drawer—instead of being kept in the patient's mouth.

Many patients, discouraged by the handicap of anatomical or psychological difficulties, find their confidence helpfully stimulated by the use of Wernet's Powder during the first critical weeks of adaptation. Its soft, resilient cushion improves retention and stability, and enables the patient to master the new denture more quickly and more effectively.

If you need office samples, use the handy coupon for a complimentary supply.

Wernet Dental Mfg. Co., Inc.
Jersey City 2, N. J.

WERNET DENTAL MFG. CO., INC.
Jersey City 2, N. J. DEPT. I-H

Please send gratis an office supply of Wernet's Powder.

Dr._____

Address_____

City_____ State_____

WERNET'S POWDER

WERNET DENTAL LORE

August 1951

Costs keep going up for dental students, too! Barring living expenses, the average 4-year dental education as of 1950 cost 51% more than it did as of 1943, when an average of $2,267 sufficed for tuition, books, supplies, etc.

• • •

The so-called "modern" chemico-parasitic theory of dental caries actually stems from the bacteriologic experiments of A. S. Underwood and W. T. Miller, reported to the International Medical Congress of 1881. This theory was expanded and confirmed by W. D. Miller of Berlin in 1884.

• • •

Queen Elizabeth of England, who suffered severe toothaches, so dreaded extractions that her bishop volunteered to have one of his own teeth pulled to help allay her fears. Her "black teeth," a foreign visitor noted, were characteristic of the English from their too great love of sugar.

• • •

Expanding horizons in dentistry: At the turn of the 20th century, American prosthetists were solely interested in impressions. Today they are as much concerned with oral pathology, nutrition and endocrinology, as they are with mechanics, physics, technics and materials.

• • •

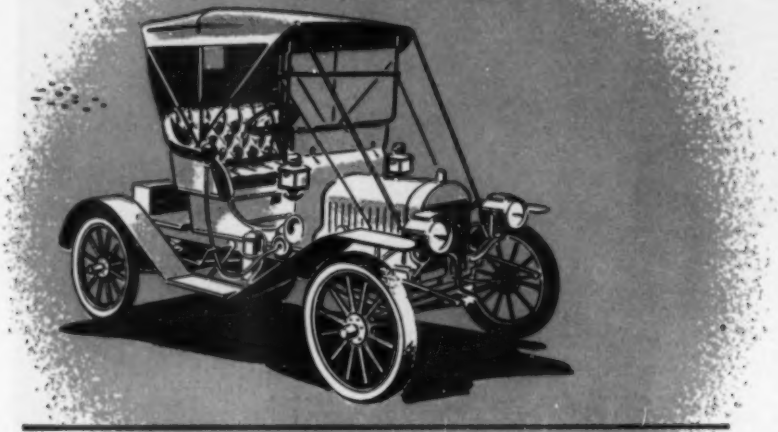
A toothbrush with a small head of two rows of bristles (12 tufts) is aptly termed the "professional" toothbrush, for recent surveys show that more dentists recommend this type than any other.

• • •

Karaya Gum is fully described in the National Formulary. The high-quality product used in Wernet's Powder well exceeds all N. F. specifications for purity, appearance, solubility, swelling properties, and elimination of foreign matter.

Speeds the Mastery of the Denture

The Best in 1910 . . .



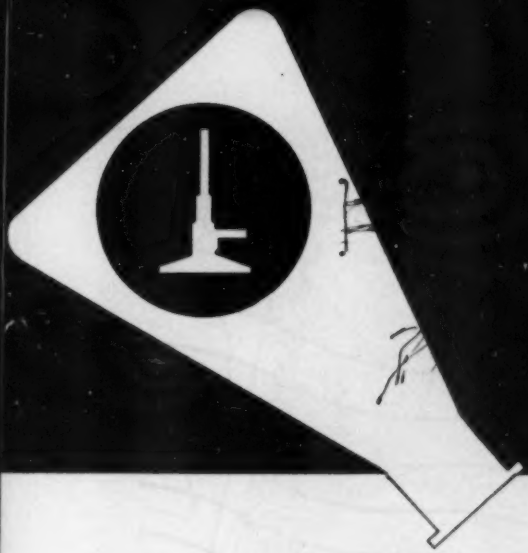
But you wouldn't drive it today!

SURE, you wouldn't drive a car of such vintage today. Since first starting to drive, you have probably purchased many new cars up to today's latest model.

But have you kept up-to-date in your dental practice? Have you replaced your first Ritter equipment with later models? Modern, progressive dentists enjoy the benefits of modern Ritter equipment. They take advantage of latest design to make their practice easier.

Make sure you maintain dental leadership by owning modern Ritter equipment.

Ritter
COMPANY INCORPORATED
BUILT UP TO A STANDARD NOT DOWN TO A PRICE
RITTER PARK, ROCHESTER 3, N.Y.



Constantly busy at your chair?

For today's busy dentists, laboratory service is indispensable. And as a result of continuing scientific advances, laboratory service is now better than ever. Take, for example, the advances made by Caulk in *Lucitone*. More than ever, *Lucitone* gives your laboratory the physical properties and the *uniform composition* to assure success in every denture.

Be thankful
for
the
SKILL
of your **LABORATORY!**

LUCITONE

you're sure when you specify

For modern materials call on *Caulk* Milford, Delaware

Lucitone is the trademark of the acrylic denture material manufactured exclusively for dentistry from DuPont resins

Dentists in every State in the Union and every Province of Canada are familiar with the slogan: *There is a Cal-Lab near your office.* As a matter of arithmetic and geography there are more than a hundred Cal-Labs in more than a hundred cities and towns from coast to coast. These laboratories are so strategically located that there is, actually, one close to your office. If not on the same street, or in the same municipality, then it is only a short distance away . . . perhaps but a matter of hours by train or plane. All of the laboratories in the Cal-Lab group have geared their service to construct your restorations in the least possible time consistent with Cal-Lab quality. Impressions and models mailed from your office will reach your nearby Cal-Lab overnight and receive the prompt attention of skilled Cal technicians. No time is lost from the working day. No effort is spared to provide for you and your patients the advantages that are obtainable only in a Cal-Lab.

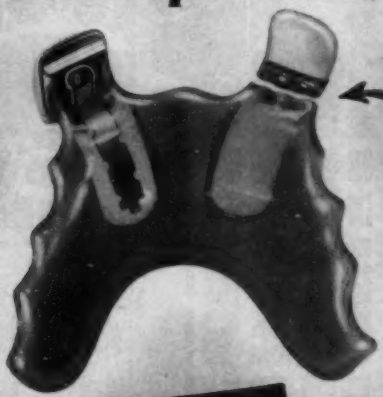
The CAL-LAB Group

CERTIFIED ARCUS LABORATORIES cal SERVICE *

Do you read CAL magazine?
Ask your CAL-LAB to send it to you.

*REG. U.S. PAT. OFF.

How to prevent breakage



HERE

— in plastic partials that include one or more *isolated* teeth

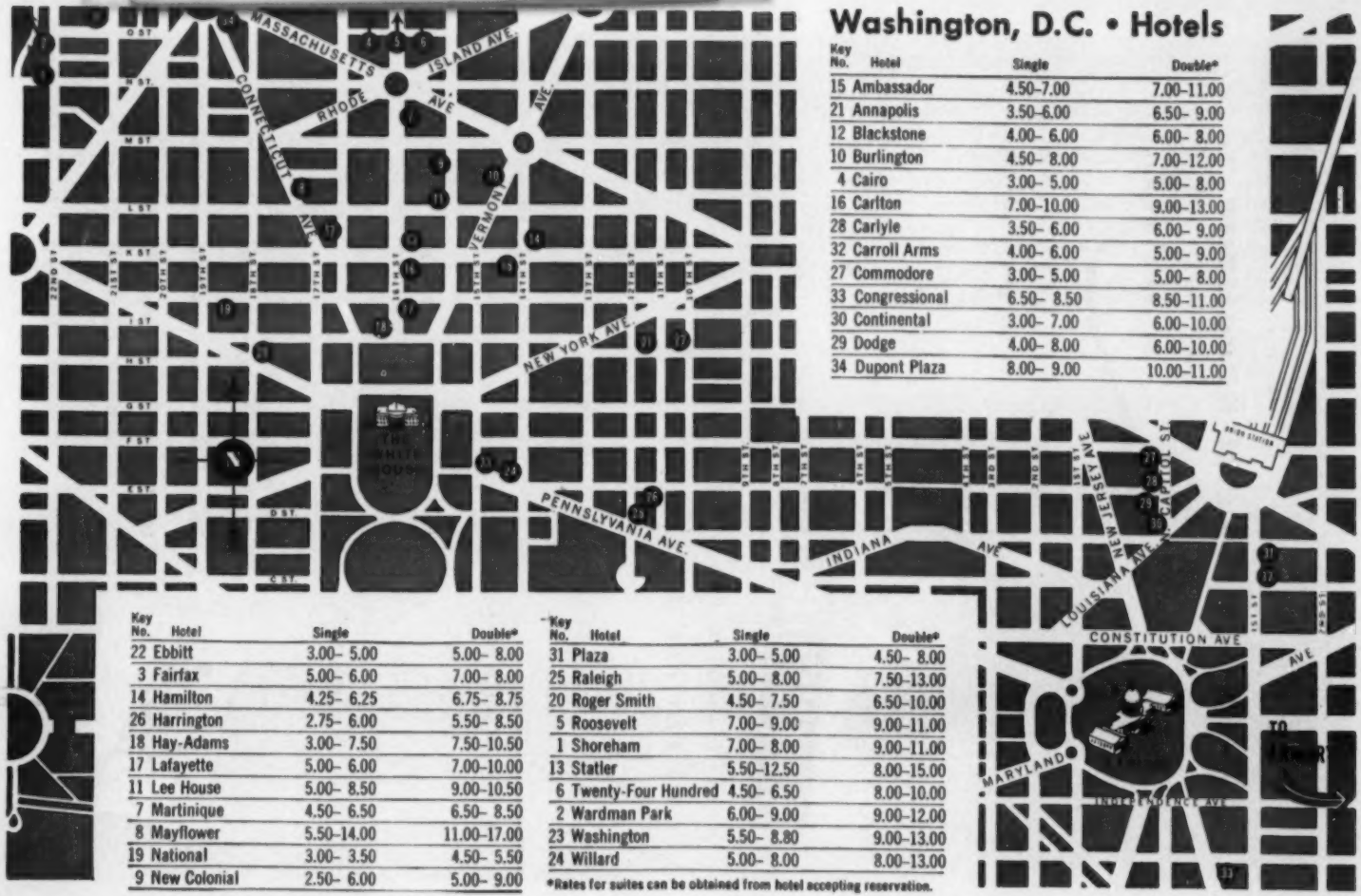
REINFORCE *the thin, small area of vulcanite or acrylic material supporting the isolated tooth – use Steele's new DENTURE BACKING with adjustable reinforcing bar*

The adjustable reinforcing bar of this new Steele's backing is embedded in the denture material – becoming an integral part of the denture. It adds strength and rigidity to the thin, narrow area of denture material on which the isolated tooth is mounted. The denture backing is designed for a standard Steele's facing – either Flatback or P. B. E. A shoulder on the lingual of the backing provides an accurate finish line for the denture material. The technic is simplicity itself.

Drop us a postal card asking for Steele's "Denture Backing Technic"

Steele's

The Columbus Dental Mfg. Co.
Columbus 6, Ohio



Washington, D.C. • Hotels

Key No.	Hotel	Single	Double*
15	Ambassador	4.50–7.00	7.00–11.00
21	Annapolis	3.50–6.00	6.50– 9.00
12	Blackstone	4.00– 6.00	6.00– 8.00
10	Burlington	4.50– 8.00	7.00–12.00
4	Cairo	3.00– 5.00	5.00– 8.00
16	Carlton	7.00–10.00	9.00–13.00
28	Carlyle	3.50– 6.00	6.00– 9.00
32	Carroll Arms	4.00– 6.00	5.00– 9.00
27	Commodore	3.00– 5.00	5.00– 8.00
33	Congressional	6.50– 8.50	8.50–11.00
30	Continental	3.00– 7.00	6.00–10.00
29	Dodge	4.00– 8.00	6.00–10.00
34	Dupont Plaza	8.00– 9.00	10.00–11.00

Key No.	Hotel	Single	Double*
22	Ebbitt	3.00– 5.00	5.00– 8.00
3	Fairfax	5.00– 6.00	7.00– 8.00
14	Hamilton	4.25– 6.25	6.75– 8.75
26	Harrington	2.75– 6.00	5.50– 8.50
18	Hay-Adams	3.00– 7.50	7.50–10.50
17	Lafayette	5.00– 6.00	7.00–10.00
11	Lee House	5.00– 8.50	9.00–10.50
7	Martinique	4.50– 6.50	6.50– 8.50
8	Mayflower	5.50–14.00	11.00–17.00
19	National	3.00– 3.50	4.50– 5.50
9	New Colonial	2.50– 6.00	5.00– 9.00

Key No.	Hotel	Single	Double*
31	Plaza	3.00– 5.00	4.50– 8.00
25	Raleigh	5.00– 8.00	7.50–13.00
20	Roger Smith	4.50– 7.50	6.50–10.00
5	Roosevelt	7.00– 9.00	9.00–11.00
1	Shoreham	7.00– 8.00	9.00–11.00
13	Statler	5.50–12.50	8.00–15.00
6	Twenty-Four Hundred	4.50– 6.50	8.00–10.00
2	Wardman Park	6.00– 9.00	9.00–12.00
23	Washington	5.50– 8.80	9.00–13.00
24	Willard	5.00– 8.00	8.00–13.00

*Rates for suites can be obtained from hotel accepting reservation.

Hotel Reservation Application . . .

92nd Annual Session—
American Dental Association
October 15-18, 1951
Washington, D. C.

A. D. A. HOUSING BUREAU

204 Star Building
Washington 4, D. C.

INSTRUCTIONS:

Reservations for hotel accommodations may be secured by completing this application and mailing it to: *A.D.A. Housing Bureau,* 204 Star Building, Washington 4, D. C. List four choices of hotels. You will receive confirmation direct from the hotel accepting the reservation. If any difficulty arises with the reservation, write immediately to the A.D.A. Housing Bureau in Washington.

(Please print or type) A.D.A.

Applicant:

Name_____

_____
(Street address) (City) (Zone) (State)

Arrival in Washington_____ a.m. p.m. Leaving_____

Accommodations:

Hotel_____ (First choice) Hotel_____ (Third choice)

Hotel_____ (Second choice) Hotel_____ (Fourth choice)

☐ Single occupancy, rate to range from $_____ to $_____ per day.

☐ Double occupancy, double bed, rate to range from $_____ to $_____ per day.

☐ Double occupancy, twin beds, rate to range from $_____ to $_____ per day.

☐ Suite of_____ rooms, including parlor, rate to range from $_____ to $_____ per day.

Occupants: (use extra sheets for additional rooms)

Rooms will be occupied by:

_____
(Name) (Address) (City) (State)

_____
(Name) (Address) (City) (State)

Right...ON THE UNIT

PHILIPS ORALIX

This most modern, compact and lowest priced dental X-ray equipment brings X-ray facilities right into the unit assembly—saves time and space. Available with mountings for all dental units. See ORALIX exhibit at the Greater Pittsburgh Dental Meeting September 11-13, 1951. Booth 53.

The ORALIX, with ultra-fine focus and grid-action tube, routinely produces dental radiographs of unexcelled detail and quality. It is quickly installed and simple to operate. Wall mount and mobile models also available. Write for details, stating name of your dealer and type of dental unit.

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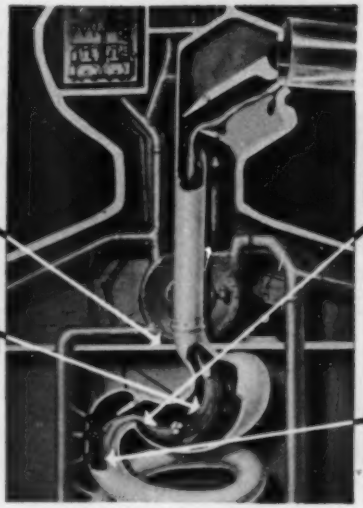

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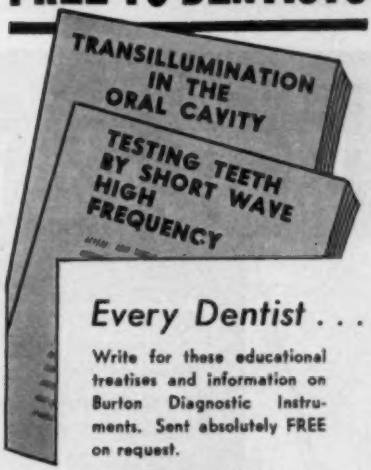

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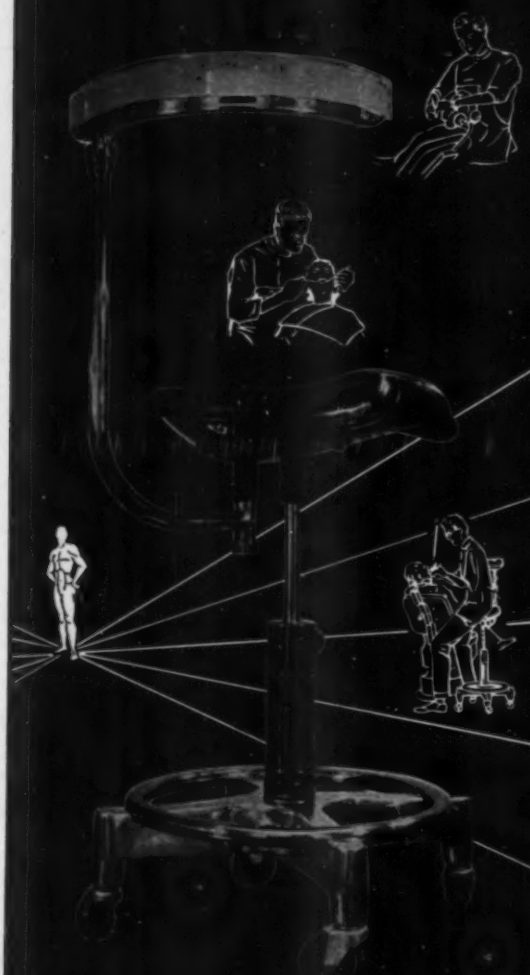

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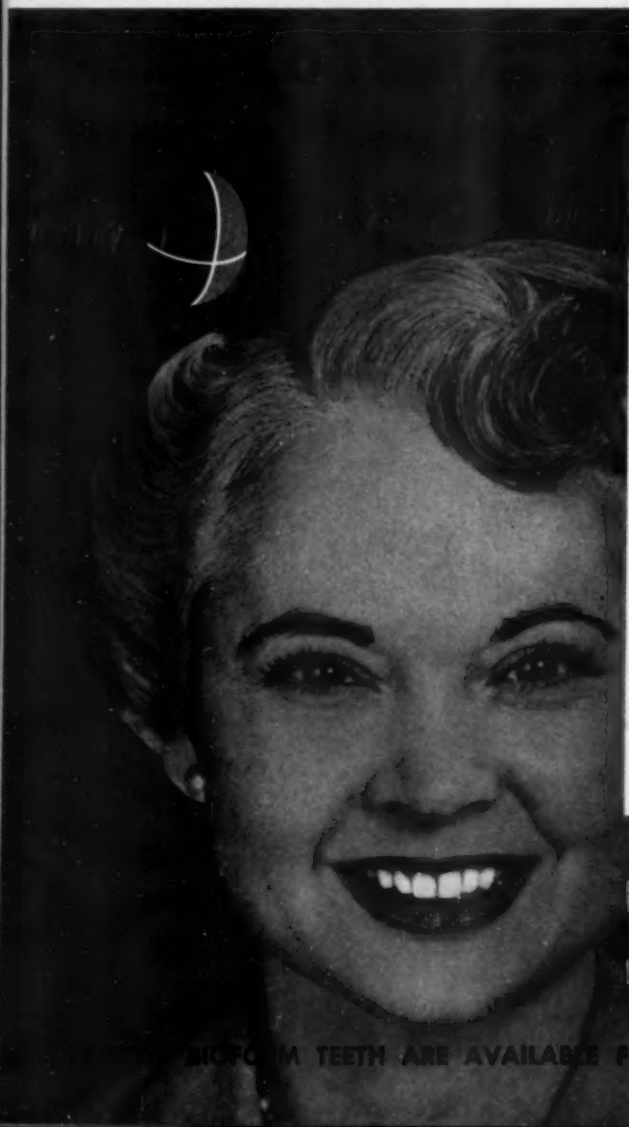

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